MAY, 1951

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Making Nickel Salts from Anodes
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Complete contents page 47

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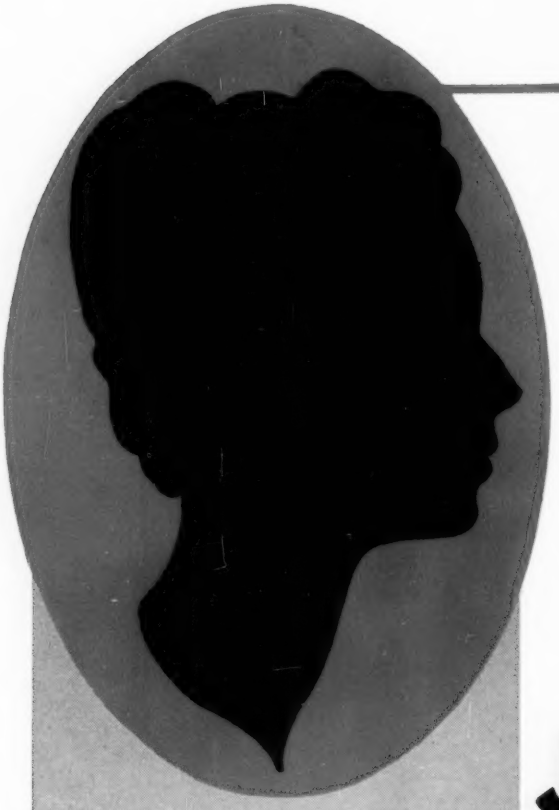

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MAY, 1951 VOLUME 49 • NUMBER 5

CONTENTS

News from Washington 49
By George W. Grupp

Editorial 51

Buffalo to be Host to 1951 Annual Convention 52

Visual and Optical Evaluation of Metal Surfaces 54
By Helmut Thielsch

Publicizing the Plating Industry 62
By W. M. Phillips

Continuous Anodizing of Aluminum Coiled Sheet 63
By Charles J. Simon

Plating and Finishing Tubing at Spang-Chalfant 65

Nickel Salts from Nickel Anodes — Porous Pot Method 66
By Nathaniel Hall & G. B. Hogaboom, Jr.

Quality Control in the Making of Plating Rectifiers 68
By Walter A. Raymond

Controlled Materials Plan to Start July 1, 1951 71

NPA Rulings Affecting the Plating Industry 74

Shop Problems 76

Patents 78

Recent Developments 80

Business Items 90

Motor City Plating News 98

Associations and Societies 100

News from California 108

Obituary 110

New Book 115

Manufacturers' Literature 116

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Safe operating requirements for open surface chemical treating tanks.

Electroplating and preliminary treatments for plating stainless steel.

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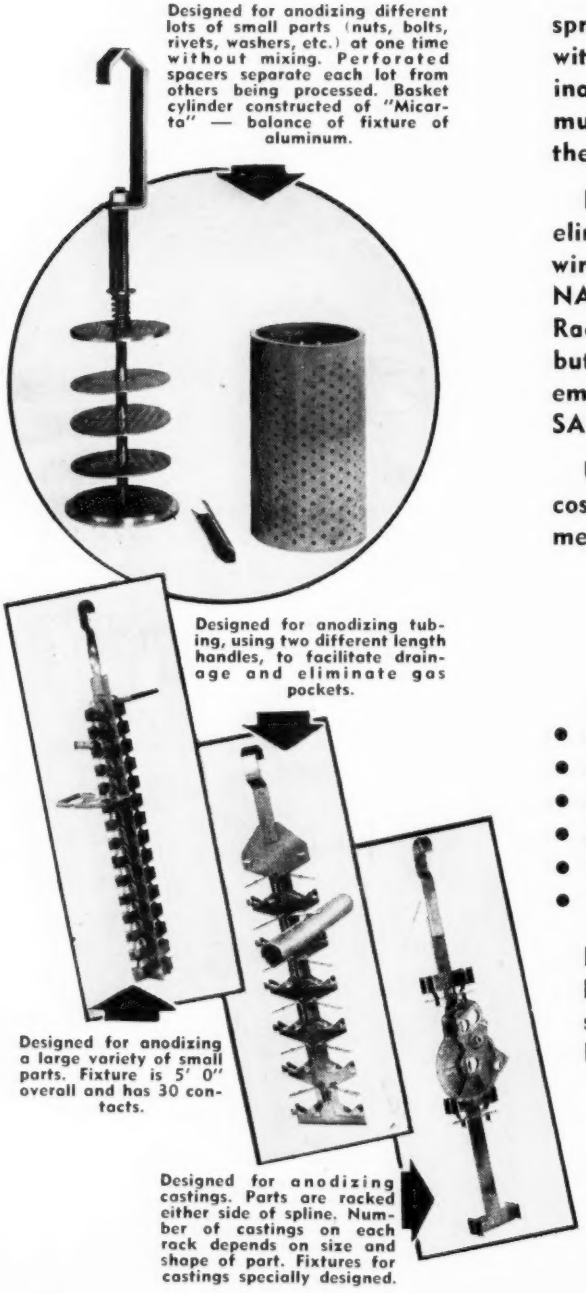

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COMPLETE METAL FINISHING EQUIPMENT

The WASHINGTON OBSERVER

George W. Grupp

News and Views from The Nation's Capitol

. The use of cadmium for civilian needs has been increased by amending M-19. This metal may now be used for dental purposes, spectacle frames, and pigments for paints. No increase for plating. See elsewhere in this issue.

. The NPA contemplates revising its copper and nickel orders to permit the use of copper and nickel plating for the internal parts of clocks and watches.

. Another amendment to Copper Order M-12 was issued to clarify the former amended order. In some particulars the new order relaxed its restrictions.

. Control of nickel was tightened by amendment No. 3 of order M-14. This amendment prohibits the usage of this metal for a host of additional items. The use of nickel silver has been restricted. Nickel plating is now banned for some hardware, household appliances, metal furniture and other items.

. Platinum was placed under control by NPA order M-54. This order prohibits the use of this metal for a long list of items, largely jewelry. Platinum plating is banned except for functional purposes.

. The use of lead was further restricted by amending Lead Order M-38. The amended order restricts consumers of lead to 100% of the consumption during the first six months of 1950. Refiners and dealers must accept DO orders for not more than 20% of their available supply in any given month.

. The silver plated flatware and holloware industry has asked the NPA to modify its regulations because existing controls will compel them to produce inferior quality products if they wish to meet normal demands for their goods.

. The NPA tinplate and terneplate order M-23 was amended to extend the use of terneplate and to restrict the use of tin plate menders.

. It is not necessary to come to Washington to get a defense contract. Most contracts are awarded by the federal government's local procurement offices.

. During 1951 there will be a shift of 5,000,000 men and women into defense production or the armed forces. The U.S. Labor Department has pointed out that women form the largest single reserve from which this country can draw additional workers as the needs arise.

. The Munitions Board has issued a manual on the "Principles of Plant Protection" against espionage and sabotage. No prime or subcontractor of a defense contract is permitted to allow any employee to have access to classified information until his loyalty has been established.

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. . . the complete background of knowledge and experience in every aspect of plating and polishing.

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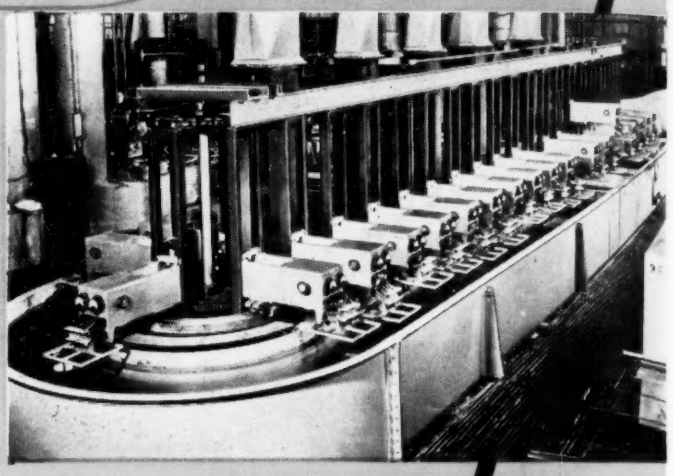

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ABLISHED 1903
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METAL FINISHING
UME 49 • NUMBER 5 • MAY 1951

Lock The Barn Door Now

One of the important, and often neglected, aspects of the "tooling for defense" program in which American industry is now engaged involves protection against sabotage. It is not out of order to consider the possibilities along this line as it could affect the plating and finishing operations.

Now, nobody would be foolish enough to suggest that the crippling of some, or even most, of the plating and finishing activities in the country could, in itself, materially affect our output of essential war weapons. To completely ignore the problem, however, would be a serious mistake and a gross underestimation of enemy purpose and tactics.

Past experience shows that no phase of our production activity is too small to escape the attention of the trained saboteur, should the occasion arise, and we hope there no longer exists any doubt about the efficiency and ruthlessness of our enemy's trained agents. The purpose of petty, but widespread sabotage is not to win a war in one bold stroke, but rather to hamper and delay production all along the line. The resulting annoyance, confusion, and expense eventually exacts its toll, and is a planned part of the overall impedance efforts.

Anyone familiar with plating and finishing room supervision doesn't have to be reminded of the many hundreds of insidious ways that could be used to upset or stop operations completely. For the very lucky ones who cannot remember all the troubles of the past, we could make out a long and gruesome list, but why risk suggesting something that even a potential saboteur may possibly have overlooked?

While there is still the time and opportunity to do it, a wise act would be to see that all equipment and materials vital to the operation of the department are under careful control and supervision, and available only to the proper persons. Any laxity is an invitation to trouble.

W. A. Raymond
Editor

Buffalo to be Host to 1951 Annual A. E. S. Convention

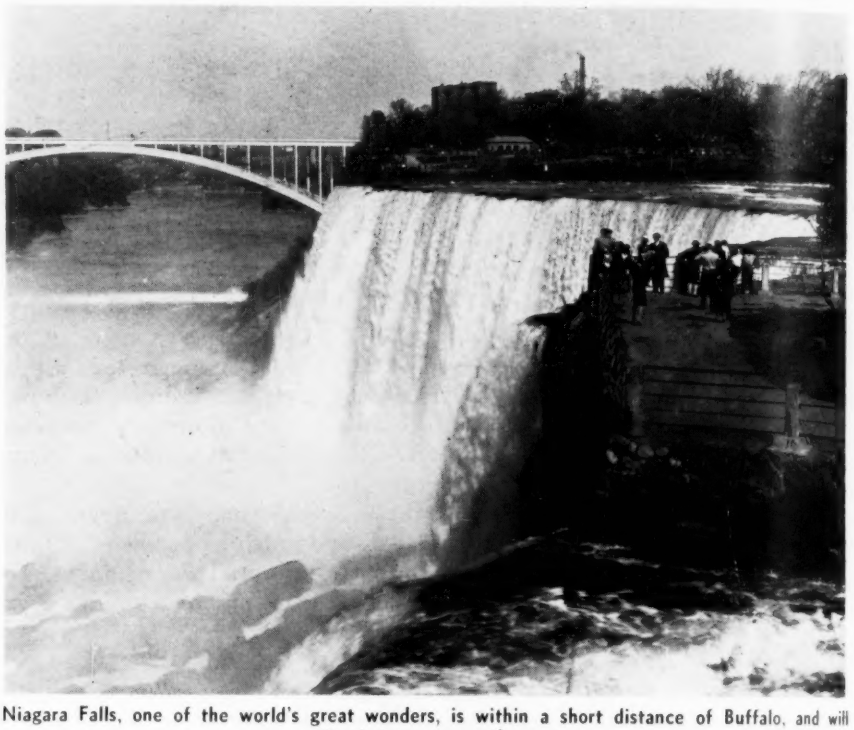
July 30-31 August 1-2

By Joan T. Wiarda, *Chairman, Publicity Committee*

BUFFALO as a convention site offers many inducements, both business-wise and social. Rich in history and industrial development, Buffalo also lies in one of the most scenic sections of the United States. Notwithstanding these normal attractions, the host city's plating fraternity is leaving no stone unturned in its efforts to make the 1951 annual convention the finest ever held and one long to be remembered.

History of Buffalo

The first white settlers came to the area now known as Buffalo, then called New Amsterdam, in 1784. When the war of 1812 was declared, Buffalo was a community of log cabins. It was not until the night of December 30, 1813 that the village, although in the vicinity of some of the heaviest fighting, suffered destruction by enemy invasion. On that night soldiers accompanied by a band of hostile Indians set fire to the village. A stiff wind fanned the flames and all but a few homes were destroyed. The settlement virtually rose again from the ashes, and on April 5th, 1816, was incorporated as the Village of Buffalo. With the opening of the Erie Canal on October 26th, 1825, Buffalo's growth as a great center of commerce began. The village became the transfer point of immigration and commerce in the great movement to the West. Buffalo was chartered a city in 1832 when its population was around 10,000. Since that early day many events of worldwide importance have occurred in Buffalo. Two Buffalonians achieved the highest office in government when *Millard Fillmore* became the 13th President of the United States and *Grover Cleveland* the 22nd and 24th. The Pan American Exposition in 1901 made Buffalo's resources known to the far corners of the world.



Niagara Falls, one of the world's great wonders, is within a short distance of Buffalo, and will attract many conventioneers.

Bert Kirchhoff, General Chairman of the 38th Annual Convention

The shipping facilities in and out of Buffalo are excellent, as it is the second largest railroad center in the United States, the axis of ten trunk-line railroads.

The Niagara Frontier is supplied with both hydroelectric and steam generated power at a very low rate. From Lake Erie flows an unlimited and unfailing supply of pure, cold water for industrial consumption at low rates.

Located in the heart of the world-famous Niagara Region and at the gateway to Canada, Buffalo is the hub of the greatest industrial activity on the North American Continent. Of the 12,154 metal working firms and contract shops operating electroplating and related departments in the United States and Canada, 9,719 of these plants, or approximately 80%, are located within a radius of 500 miles. Buffalo is considered a steel and metal-working center, and also excels in the metal finishing field in the production of chemicals, automobiles, automobile accessories, electrical equipment, rubber and aircraft.

Buffalo is proud of the availability of its higher education. In addition to the University of Buffalo, having an enrollment of 11,000, this is the home of Canisius College, State Teachers College, and the Cornell University Aeronautical Research Laboratory.

As a Convention City, Buffalo is a natural, and it is certain that the Host Branch will put on an excellent convention for the fellow members of the *American Electroplaters' Society*.

The educational program is being well planned and the social activities have been arranged for your pleasure and entertainment.

The Buffalo Branch

The Buffalo Branch is almost 14 years of age. While it is the 25th Branch in size, it is very proud of its record, being National A.E.S. Convention hosts in 1943 and again in 1951.

In 1937, *Joseph Ruff*, *W. D. Hart* and the late *Warren Guy* and *Charles Logan*, with the capable and untiring assistance of *Steen Thompson*, Past President of the National Society and the late *Bill Kennedy*, then Executive Secretary of the National Society, started the Buffalo Branch of the American Electroplaters' Society. Another man to be given credit is *John Honnecker*, now president of the Poloplate Co., Cleveland, O. who at that time was sales representative for the Frederick Gumm Chemical Co. John was successful in arranging for a meeting room at the Stafford Arms Hotel, and boosted the A.E.S. and solicited members while calling on the trade.

In 1938 the Branch had 24 members; it now has 84 members.

The Branch is very proud of its well-attended monthly meetings and, at all times tries to put on a good technical program. *Dr. C. J. Wernlund*, Research Dept. E. I. Du Pont de Nemours Co., Inc. Niagara Falls, N. Y. the Educational Chairman for the 1951 Convention, was one of the first speakers for the Branch.

Left to right: Mrs. H. A. Fudeman, Mrs. Joan Wiarda, Mrs. Bert Kirchhoff, Mrs. Frank Nowakowski, Mrs. Roland Campbell, Mrs. William Hart, Mrs. James Moneypenny, Mrs. Anthony Nigro, Mrs. Ben Fortin, Mrs. Robert Potter, Mrs. Leon Nowak, Mrs. Stan Sharmen, Mrs. C. J. Wernlund.

Dr. Wernlund was General Chairman of the 1943 Convention, when the Buffalo Branch went over the top and broke all previous registration records. Their hope and aim for 1951 is again the "*Biggest and Best A.E.S. Convention.*"

Convention Committee Members

The committee chairmen and branch members are representatives of the prosperous diversity of industry in Buffalo and the outlying area. These men are:

Bert Kirchhoff, Branch President and General Convention Chairman — Jamestown Electroplating Works, Jamestown, N. Y.; *W. M. Fotheringham*, President and owner W. M. Fotheringham, Buffalo, N. Y.; *Dr. C. J. Wernlund*, Educational Chairman, Research Dept. E. I. Du Pont de Nemours Inc., Niagara Falls, N. Y.; *Stanley Bush*, Financial Secretary, Bush Brothers, Olean, N. Y.; *H. A. Fudeman*, Program, Trico Products Corp., Buffalo, N. Y.; *Joan T. Wiarda*, co-Program and Publicity, representative of Metal Finishing, New York, N. Y.; *W. D. Hart*, Registration, Sylvania Electric Products Inc., Buffalo, N. Y.; *Ben Fortin*, Hotel, representative Oakite Products Inc., New York, N. Y.; *Anthony Nigro*, House, Sterling Silver Plating Works Inc., Buffalo, N. Y.; *Leon Nowak*, Transportation, Star Plating Works Inc., Buffalo, N. Y.; *James Moneypenny*, Banquet, Barcalo Mfg. Co., Buffalo, N. Y.; *Joseph Ruff*, Picnic, Trico Products Corp. Buffalo, N. Y. In addition to the chairmen, there are active members from the following companies: American Optical Co., Bell Aircraft Corp., Chevrolet - Buffalo Div. of General Motors Corp., Remington Rand, Inc., Pennsylvania Salt Co., Plumb Tool Co., S. A. Day Mfg. Co., Westinghouse Electric Corp. and the Rudolph Wurlitzer Co., Niagara Searchlight Co., McKaig Hatch, Inc., J. H. Williams & Co., Manzel, Inc., Markel Electric Products, Elrae Pressed Metals, Inc. The contract plating shops are also well represented in our group, such as Atlas Electroplating Co., and National Finishing Corp.

Front row left to right: James Moneypenny, Dr. C. J. Wernlund, Mrs. Joan Wiarda, Bill Fotheringham, Bert Kirchhoff, Anthony Nigro, Leon Nowak, Ben Fortin, H. A. Fudeman, Stanley Bush. Rear row: Roland Campbell, Robert Potter, Harold Day, Frank Nowakowski, Simon Bush, Don Rice, Ward Stewart, Bill Hart, Joe Ruff, Joe Cuerdon, T. W. Rudolph.

Visual and Optical Evaluation of Metal Surfaces

By Helmut Thielsch*

This is a continuation of the discussion started in the Sept. 1950 issue of Metal Finishing on the fundamentals of surface measurement and classification.—ED.

A GREAT variety of instruments have been developed for the purpose of defining or analyzing the contours or geometry of surfaces. However, it is important to realize that, because of the diversities of the techniques and applications of the various instruments, the same surface characteristics are not analyzed by all instruments alike. For example, under ideal conditions it may seem desirable to obtain an enlarged three-dimensional impression of a surface by means of the binocular microscope. However, accurate measurement and photographic reproduction of such a three-dimensional impression is very complicated, if not impossible. Thus two dimensional procedures are generally employed. For example, direct viewing of a surface by means of a microscope will produce a two-dimensional pattern in which the peaks and valleys are leveled. On the other hand, examination of a vertical cut through the specimen, or surface examination by means of tracer instruments will allow direct or indirect evaluation of the magnitude of the peaks and valleys in two directions.

Another factor which influences the suitability of the various surface-measuring instruments is their adaptability to shop- and laboratory-testing techniques. Thus, whereas some techniques may lend themselves well to the rapid shop evaluations necessary in production control, others may require expensive equipment, complicated testing procedures, or other features which may restrict the overall usefulness of the technique to a few isolated applications.

In the visual and optical techniques, the surface is generally reproduced by photographic means. Moreover, most procedures also make use of a microscope to enlarge the particular surface area that is of interest.

*Welding Research Council, New York 18, N. Y.

Figure 1. Light- and dark-field illumination of a polished steel bar.

Because of these features, the optical techniques are relatively time consuming and, consequently, they are not readily adapted to production control in the shop. However, some of the optical methods reveal certain surface characteristics which cannot be determined by the usual shop testing methods. These surface characteristics may be of vital interest to the study of the behavior and nature of surfaces and the effects of the many surface-finishing operations. Flaws within the surface are also most readily observed by optical means.

A tabular outline of the various optical methods which are most commonly used is given in Table I.

Examination By Sight

Although examination by sight represents the simplest procedure for the evaluation of surfaces, it is sufficiently accurate only for very rough surfaces which are not critical from a performance standpoint. As *Broadston*[1] pointed out, the idea that — the brighter a surface appears the smoother is its finish — is a misconception. Thus it is possible that a machined steel cylinder with a h_{rms} value of 250 microinches or more will appear bright, whereas a ground and lapped valve surface with a finish of about 5 microinches may appear gray, dull, and without lustre. Only when surfaces which have experienced similar finishing operations are compared, is examination by sight useful for even the roughest production control.

Table I. Classification of the Major Optical Procedures

2-Dimensional		*3-Dimensional*
HORIZONTAL (SURFACE) EXAMINATION	VERTICAL (SECTIONAL) EVALUATION	
sight	optical sectioning*	binocular microscope
projection	cross sectioning*	stereomicroscopy
optical comparator	taper sectioning*	dark-field illumination in optical microscope
rigid replicas (observed by optical reflection)		pliable replica procedures (observed by optical transmission)
light-field illumination in optical microscope		pliable replicas (shadow-cast)*
		interfermoetry*

**Allows determination of roughness values such as h_{rms}, h_{max} or others.*

Examination By Projection

Direct surface examination by projection in a light beam is rarely performed because the necessary meth-

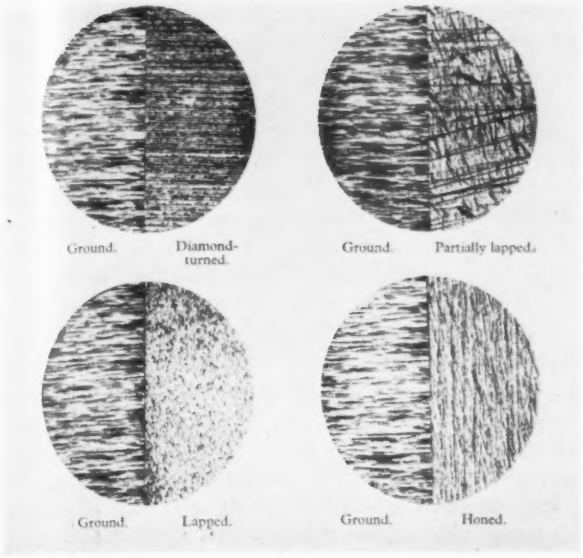


Fig. 2. Comparison by means of optical comparison microscope of four differently machined specimens with the same ground standard.[2]

ods are quite complex and generally require special equipment. The only major application is the so-called section projector which is used in the examination of the edges (shape) of gear teeth.

Microscopic Examination

Microscopic examination of surfaces generally is accomplished with magnifications between 50 and 1000 diameters. The resolving power, i.e., the finest separation between two points or scratches that may be distinguished, is about 20 microinches. Although finer resolutions may be obtained by means of oil-immersion techniques or by the use of ultra-violet light, these special techniques are rarely employed. The depth of focus, that is the variation in vertical depth of the surface roughness which will appear sharply defined under the microscope, will vary between about 25 and 100 microinches. The range is greater for the smaller magnifications.

Illumination of the surface may be performed directly through the lens system of the microscope, in which case the surface planes that are vertical to the objective axis will appear light, whereas all other planes will appear dark. This type of illumination is also called *light-field illumination*. It is the one most commonly used.

Anther method that is used is *dark-field illumination* in which the surface is illuminated from an angle so that the planes which are perpendicular to the objective axis appear dark, whereas the inclined planes appear light — unless they are screened by shadow effects. Inclined illumination can be obtained by various means such as by use of special mirrors within the microscope, or by attaching the light sources at an angle to the microscope. Oblique or dark-field illumination improves the resolving power considerably.

Examples of light- and dark-field illumination of a polished steel surface are shown in Figure 1.

Optical Comparator

In most microscopic examinations, it is desirable to compare the surface of the specimen with a standard. Since comparison by memory is relatively inaccurate, it is preferred to view the specimen and the standard simultaneously. This is accomplished with the optical comparison microscope (or comparator) which offers a quick shop-method for comparing the finish of a specimen against that of a standard. In its essential features, the microscope consists of two objectives and a single eyepiece. While one objective lens is focused on the specimen, the other objective lens views the standard. Examples of several surfaces are shown in Figure 2. For comparison, the actual roughness values of these surfaces, as determined with a tracer-type instrument, are given in Table II.

Table II. Surface Roughness Values of the Specimens Shown in Figure 2

Finely ground standard	2.2	(h_{ave})	microinches
Diamond-turned specimen	6.6	"	"
Partially lapped specimen	1.7	"	"
Finely lapped specimen	1.2	"	"
Honed specimen	1.0	"	"

Magnifications between 25 and 75 diameters are ordinarily used. Moreover, best results are obtained when the standard and the specimen are made of the same material and are finished by similar finishing operations. The two specimens should also be of similar size and shape.

Replica Techniques

It is often undesirable or difficult to examine the surface of a specimen directly. For example, the surface may be part of a structure too large for transportation to certain testing instruments, or the surface may be located within the structure, inaccessable to many instruments, particularly microscopes.

These and other problems are generally solved by use of the so-called "replica" techniques in which an impression or casting is made of the surface by use of a suitable material. The *replica* is subsequently removed and is examined either visually or by microscopical or electron-microscopial means. The film may also be mounted on a photographic slide which can be viewed through an ordinary slide projector by projection on a screen. Ordinarily magnifications between

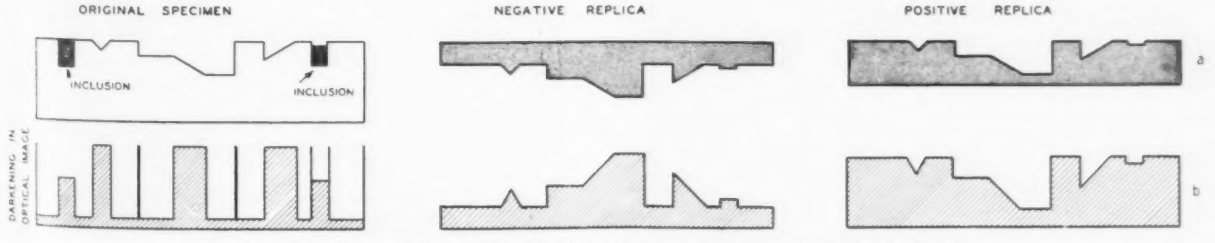


Figure 3. Schematic illustration of (a) the types of replicas that may be used and (b) the darkening produced in the image of the microscope.

Figure 4. Rigidly cast thermosetting-plastic replica of a damaged gear tooth obtained by pouring plastic around the tooth.

10 and 30 diameters are studied by this method. Another method consists of placing the replica film in the negative holder of a photographic enlarger. Projection prints may then be made directly by photographic techniques. In a few cases, examination of some of the stronger replicas may also be made by use of tracer-point instruments. This may be desirable when comparisons between the appearance of surfaces and actual roughness values are to be made, particularly when the tracer-point instruments cannot reach inaccessible areas in the original specimen from which, however, replicas are readily prepared.

Replicas may either be positive or negative. The differences are illustrated in Figure 3a, which shows a hypothetical specimen and the respective positive and negative replicas. Inclusions and other defects which may exist in the original specimen are not revealed by the replica — unless these inhomogeneities appear in relief. Etching techniques will generally produce this necessary relief.

The differences in thickness of the replica film produce variations in the amount of light that is transmitted. Thus when negative replicas are studied in a transmission microscope, peaks in the original specimen will appear light, whereas valleys and pits will appear dark. The density distribution (darkening) of the original surface and of the respective replicas, when viewed in a transmission microscope, is sketched in Figure 3b.

The major types of replicas which may be produced are generally made from either *pliable films* or *rigidly cast replicas*. In addition *photographic-emulsion replicas* have recently been suggested.[3]

Pliable Replicas

The pliable or peelable film methods generally make use of an organic solution which contains a dye.

The most commonly used method is the so-called *Formvar* process in which a solution of polyvinylformal is dissolved in ethylene dichloride. The solution should also contain about 1% by weight of an oil-soluble dye, such as ethyl violet.[4] The dilute solution is flowed over the surface area which is to be examined. As the solvent evaporates, a thin pliable film remains on the surface which provides a negative impression of the surface contours. This film is then stripped by means of a gummed transparent acetate tape and is ready for examination either under a microscope or with a projector. The oil-soluble dye serves to increase the contrast of the replica film.

A slight modification of the *Formvar* process is the commercial *Faxfilm* method. Again a volatile organic solvent is flowed over the surface of the specimen. Subsequently, a transparent plastic film, which is soluble in the solvent, is pressed on the wetted surface. The solvent dissolves or softens the bottom side of the plastic film. Subsequent evaporation of the solvent leaves a negative replica film which has an exact impression of the specimen surface on one side and a plane surface on the other side. This film is then peeled off and is generally mounted in a card for examination by optical projection or by microscopic means.

Pliable-film replicas are also commonly used when curved surfaces are to be examined, since it is not possible to have any extensive section of a curved surface in focus under the microscope at one time. By straightening the pliable film, a much larger area may be brought into focus for study under the microscope or in a projector. It is also an important advantage that replica films, which are mounted, may be easily filed and retained as permanent reference records.

Pliable-film methods are unsuitable for the examination of surfaces with severe micro-roughness, deep pits and/or sharp edges; during peeling, these sharp contours would cause the film to break or tear. This drawback may be overcome by the use of rigidly cast replicas.

Rigidly Cast Replicas

In the rigid-casting techniques, a liquid solution is generally "cast" onto the surface which is to be examined. After the liquid has been allowed to solidify, the cast replica is removed and is ready for visual or microscopic examination.

Thermosetting plastics are now the most commonly used materials for the cast type of replicas. A free-flowing plastic material, such as a polyester resin, will harden on the surface of the specimen in about 15 to 25 minutes after the addition of a catalyst. On the whole, this method provides negative replicas of considerable accuracy. The advantages of this method are the ease of handling, and the important fact that pressure and external heat are not required to cause hardening of the plastic replica material. Moreover, these plastic replicas, because of considerable rigidity, may be readily examined by tracer-point instruments. An example is shown in Figure 4.

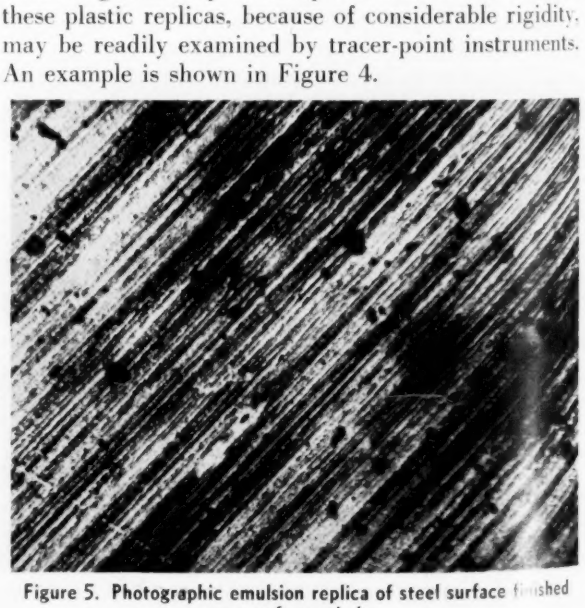


Figure 5. Photographic emulsion replica of steel surface finished on surface grinder.

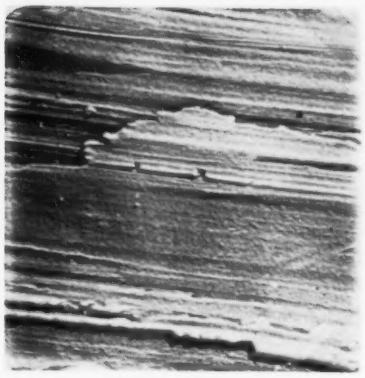


Figure 6. Cylindrically ground steel shaft. Positive Formvar replica. Magnification 5000 X.[5]

Older methods, which are generally inferior to the thermosetting types of plastic replicas, make use of paraffin wax, plaster, a sulphur-graphite mixture, or other materials.

Photographic-Emulsion Replicas

A simple procedure for the reproduction of relatively flat, rough surfaces (ground, machined, etc.) is to press a nearly flat surface against a fine-grained photographic emulsion at pressures of about 15,000 psi.[3] The plate, after it has been developed, is generally examined under a microscope at magnifications between 25 and 200 diameters. A typical structure of a steel surface which had been finished on a surface grinder is shown in Figure 5.

Although the photographic-emulsion replicas may seem useful to the examination of relatively rough surfaces, on finely finished surfaces it is doubtful that this method will take up the detailed configurations. Thus in the examination of the smoother surfaces either the pliable or rigidly cast replicas are more suitable.

Electron-Microscopic Methods

The great advantages of the electron microscope over optical instruments are (1) its ability to produce magnifications between 500 and 100,000 diameters, (2) a maximum resolving power of about 0.05 microinch, and (3) a depth of focus up to 500 microinches.

Two principal methods can be used to observe surface finish. They are based upon either reflection or replica techniques. In the *reflection method* a small segment of the metal surface itself is placed in the electron microscope. The electron beam is reflected from the surface at a low angle of incidence, of the order of 4 degrees, and passes on to the viewing screen or the photographic plate. The major disadvantages of this method are (1) the difficulty of analyzing quantitatively the height of the surface irregularities, (2) the lack of sharpness caused by partial absorption and deviation of electrons passing through metal surface layers, and (3) the necessity of cutting a small segment from the original metal specimen.

Because the *replica techniques* do not suffer from these disadvantages, they are generally used in favor of the reflection method. The main requirements of the replica films are that they must be sufficiently thin to allow penetration by the electron beam in the electron microscope, and that they take up a relief identical to the metal surface from which the film has been stripped. A positive *Formvar* replica of a cylindrically ground steel shaft is shown in Figure 6.

A three-dimensional effect is produced by subsequent deposition of a metallic shadow on the film in a suitable metal-distillation apparatus. By placing a very smooth edge or glass wire between the filament from which the metallic vapor is produced and the replica film, a shadow demarcation line is obtained. For example, if the filament is placed at a 45 degree angle to the replica film, the shadow line will show in relief the actual amplitudes of the surface irregularities, Figure 7.

A schematic diagram of the shadow-casting system suggested by *Seelinger*[6] is shown in Figure 8. Wire "W" represents the filament from which metal atoms are evaporated when it is heated just under the melting point of the metal. The wire should be kept short, otherwise expansion at the elevated temperatures causes it to sag. The smooth edge E is placed parallel to the filament wire at a distance A. The shadow demarcation line is sharpest if the filament wire is kept as thin as practically possible. Moreover, the smooth edge should be placed close to the replica and away from the filament.

The greatest advantage of the replica method is the obvious ease with which electron-photomicrographs of very thin surface irregularities may be interpreted. Unfortunately, the techniques of replica preparation and examination are quite tedious and require special skills and expensive equipment. Thus, electron microscopic examination has up till now found only very limited application in commercial surface studies. However, there are many as yet unanswered problems pertaining to surface condition and wear which might be better understood if careful studies with the electron microscope are undertaken.

Sectioning Methods

Sectioning may be accomplished by optical means or by mechanical cutting of a vertical or inclined (taper) section from the specimen.

Although optical sectioning does not necessitate the destruction of the original specimen, as is required by

Figure 7. Boundary shadow technique on polished steel specimen. The shadow line represents the surface profile. Magnification about 6600 X.[6]

the mechanical sectioning methods, optical sectioning does not provide the detail and accuracy produced by the latter methods. Moreover, mechanical sectioning allows examination of the structure underneath the surface. This is often a highly desirable feature.

Optical Sectioning

In optical sectioning, a profile picture is obtained by producing an outline of the surface with the aid of a straight edge. Several somewhat similar methods have been recommended.

In the *straight-edge method* developed by *Schmaltz*[7] the specimen is illuminated by a rectangular light beam, as is shown in Figure 9. The image of the straight edge, which limits the rectangular beam, is examined from a different angle by means of a microscope.

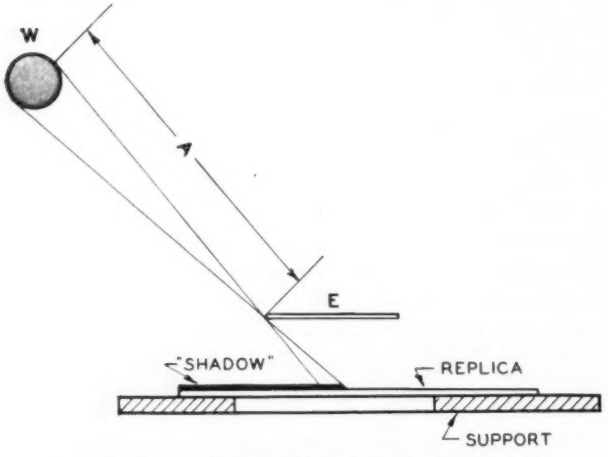


Figure 8. Schematic sketch of shadow technique suggested by Seelinger.

Way[8] has modified the above method somewhat by placing a straight edge, such as a safety razor blade, directly against the surface and illuminating it by a narrow rectangular light beam. The edge will produce a shadow on the surface, the projection of which on a certain plane will correspond to the true shape of the profile. Typical results with different surfaces are shown in Figure 10.

The roughness of the surface examined by either of these methods is a function of the average deviation from a calibrated cross-hair in the eyepiece of the microscope.

The optical-sectioning methods are most suitable in studies of ordinary machined surfaces. Highly polished surfaces produce less satisfactory results particularly since the resolving power of the objective lens does not allow for the detection of surface irregularities smaller than about 10 to 30 microinches.

Mechanical Sectioning

The relatively poor resolving power of the optical-sectioning methods can be considerably improved by mechanical sectioning. However, the major disadvantage of mechanical sectioning is that this method necessitates the destruction of the original specimen and the preparation of a small specimen suitable for visual or microscopic examination.

Because most mechanical-sectioning operations generally tend to distort and round off the edges of the surface, it is best practice to first cover the surface

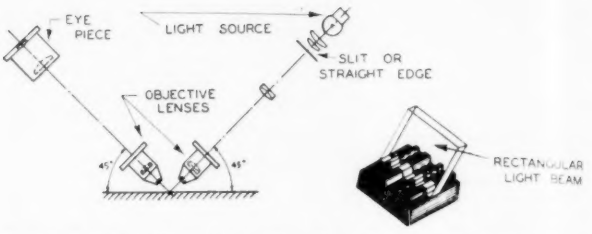


Figure 9. Principles of straight-edge shadow method developed by Schmaltz.

by either electroplating a metal having a hardness similar to the base metal or by casting low-melting alloy such as Woods metal onto the surface.

Cross-sectioning

In this method, a vertical section is cut from the specimen and examined under the microscope. The section is generally prepared by sawing, grinding, and polishing. However, light, soft metals may also be sectioned by means of a microtome.

Since cross-sectioning does not provide as much detail of the surface contours as taper sectioning, the latter method is now generally preferred.

Taper-sectioning

Nelson[9] and subsequently other investigators[10,11,12] further developed the cross-sectioning technique by cutting the surface of the specimen diagonally — usually at a very small angle to the plane of the nominal surface. Thus, by elongating the surface irregularities in one direction, an apparent magnification is created. For example, with a taper angle of 2° 17″ the one most commonly used, a vertical magnification of 25 diameters is produced. The horizontal component of the surface irregularities is not changed.

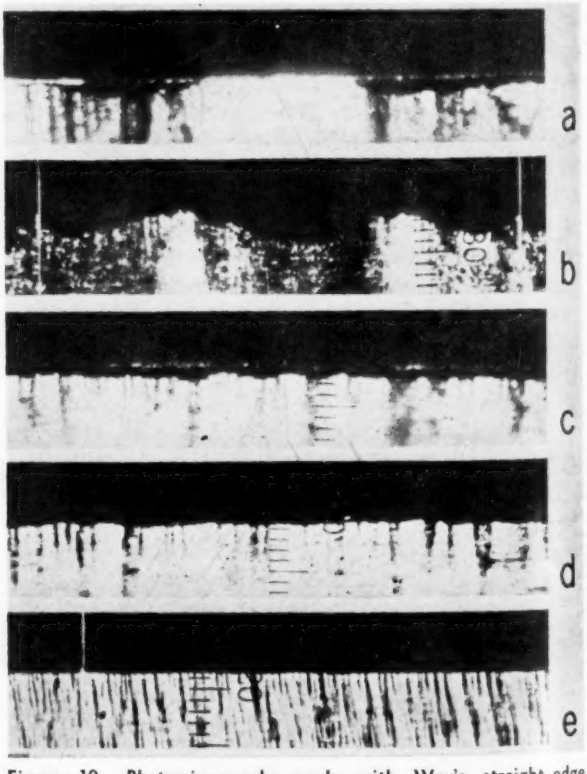


Figure 10. Photomicrographs made with Way's straight-edge shadow method; (a) gear tooth, (b) finely turned surface, (c) ground surface, (d) finely ground surface, (e) cold rolled strip steel surface.

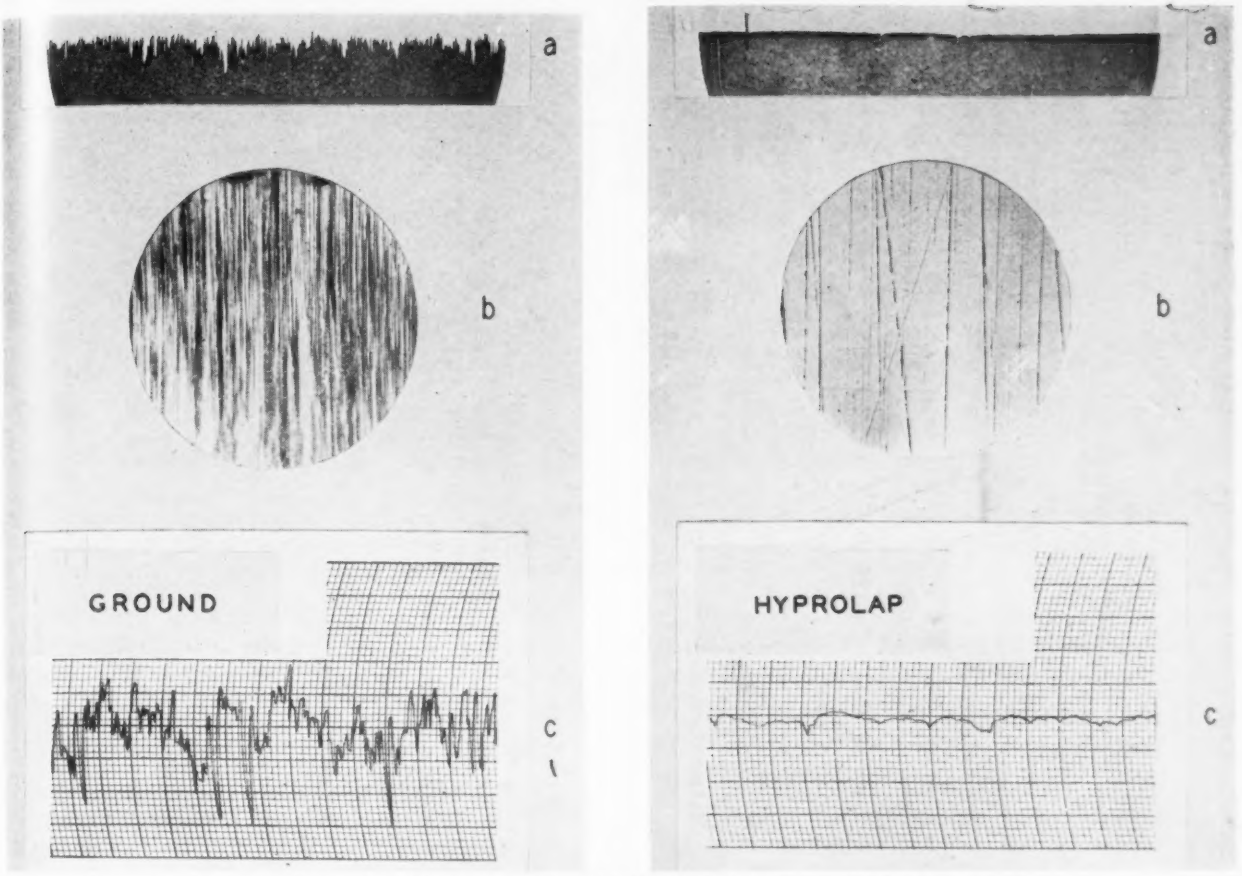


Figure 11. Comparison of (a) taper sections with (b) photomicrographs and (c) tracer recordings obtained by means of Brush Surface Analyzer.[9]

Magnifications	Vertical	Horizontal
Taper Sections	2,500 X	100 X
Photomicrographs	100 X	100 X
Brush Surface Analyzer Measurement	25,000 X	100 X

Comparative Roughness		ground	hyprolapped
Profilometer	(h_{rms})	6	1.2
Brush Surface Analyzer	(h_{max})	50	7
Taper Section	(h_{max})	85	26

Further microscopic examination allows vertical magnifications of from 100 to 10,000 diameters.

In its essential features, taper sectioning consists of grinding the bottom face of the small specimen parallel to the surface to be examined. The surface is then cleaned (degreased) and plated with a metal of similar hardness. Thus nickel is generally used on steel surfaces, whereas silver or copper have been suggested for softer materials. Finally the specimen is mounted on an accurately made wedge and ground down by a surface grinder until the ground surface extends across the whole upper face and the specimen-plated metal interface cuts across the center of the specimen. Two typical taper sections are shown in Figure 11. It is apparent how much more information can be obtained from taper sections than from direct photomicrographs of the surface. For comparison, tracer curves are also shown.

Although the surface is generally covered by a thin electroplated coating of nickel (or other materials), careful grinding and lapping may obviate the plating procedure. This is primarily desirable when the surface within the grooves is to be studied by reflecting the light rays (from the microscope lens system) perpendicular to the specimen surface.

When interpreting photographs or photomicrographs of taper sections, it is important to realize that considerable differences in the magnifications generally exist between the horizontal and vertical components of the surface.

Because this method also reveals the metal underneath the surface, it is used in many studies in which it is desired to study the effects of finishing operations on the structure underneath the surface.

Taper sectioning has been used to study the effects of lubrication on sliding surfaces,[13,14] wear, machining, sand and grit blasting,[12] etc. It is also a useful method for studying the thickness, uniformity, and characteristics of surface coatings which are produced by electroplating, galvanizing, oxidation and other techniques.[11] Defects in the surface coating, slag in-

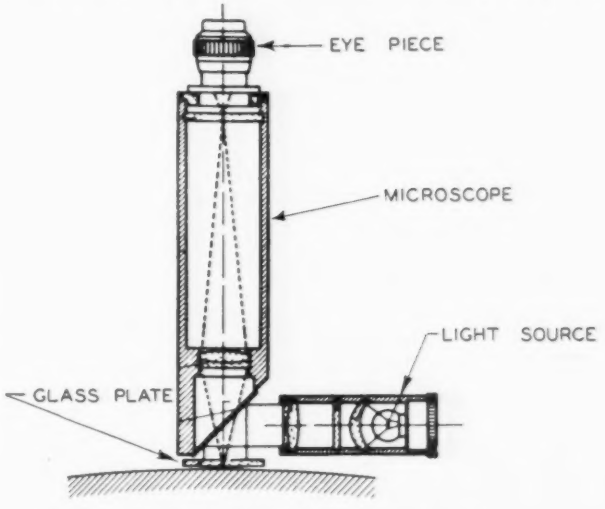


Figure 12. Principles of Interferometer.

Table III. Applications and Characteristics of Optical Methods

Method	Primary Application	Evaluation of Numerical Roughness Value (h_{rms} or h_{max})	Photographic Record	Types of Surfaces Generally Studied	Depth of Roughness Measurement (Depth of Focus) microinch	Magnification diameters	Resolving Power microinch	Necessity for Destruction of Specimen
Sight	Shop	No	Yes	flat and curved	1,000	1	10,000	No
Projection	Industr. Lab.	No	Yes	gear teeth		1-10		No
Microscope	Industr. Lab. and Research	No	Yes	primarily flat	25-100§	25-1000	5-20	Yes or No
Optical Comparator	Shop	No	Yes	primarily flat	100-500	25-75	20-50	Yes or No
Pliable Replicas—microscope	Industr. Lab. and Research	No	Yes	flat and curved		25-1000		No
slide projector	Industr. Lab.	No	Yes	flat and curved		10-30		No
phot. enlarger	Industr. Lab.	No	Yes	flat and curved		2-10		No
Rigid Replicas—microscope	Industr. Lab. and Research	No*	Yes	primarily flat‡		25-200		No
Photographic Emulsion Replicas	Industr. Lab.	No	Yes	flat		25-200		Yes or No
Electron Microscope—replicas	Research	No†	Yes	flat and curved	500	500-100,000	0.05	No
Optical Sectioning (Schmaltz)	Industr. Lab.	Yes	Yes	flat and curved	600-1000	80		No
					200-600	150		
					20-40	500	20	
						50-500	30	No
Optical Sectioning (Way)	Industr. Lab.	Yes	Yes	flat and curved		25-1000	10	Yes
Cross Sectioning—Microscope	Industr. Lab.	Yes	Yes	flat and curved		5-35	300	Yes
Taper Sectioning—Sight	Industr. Lab. and Research	Yes	Yes	flat and curved		to 15,000 vert.		
Microscope	Industr. Lab. and Research	Yes	Yes	flat and curved		to 1,000 horiz.	5 vert.	Yes
Interferometry	Industr. Lab. and Research	Yes	Yes	flat and slightly curved		to 1,000	0.2-1	Yes or No

*Roughness values may be obtained by means of tracer instruments.
†Roughness values may be obtained by shadow casting.
‡Curved surfaces may be studied by the preparation of pliable replicas from the rigid replicas.
§Greater for the lower magnifications.

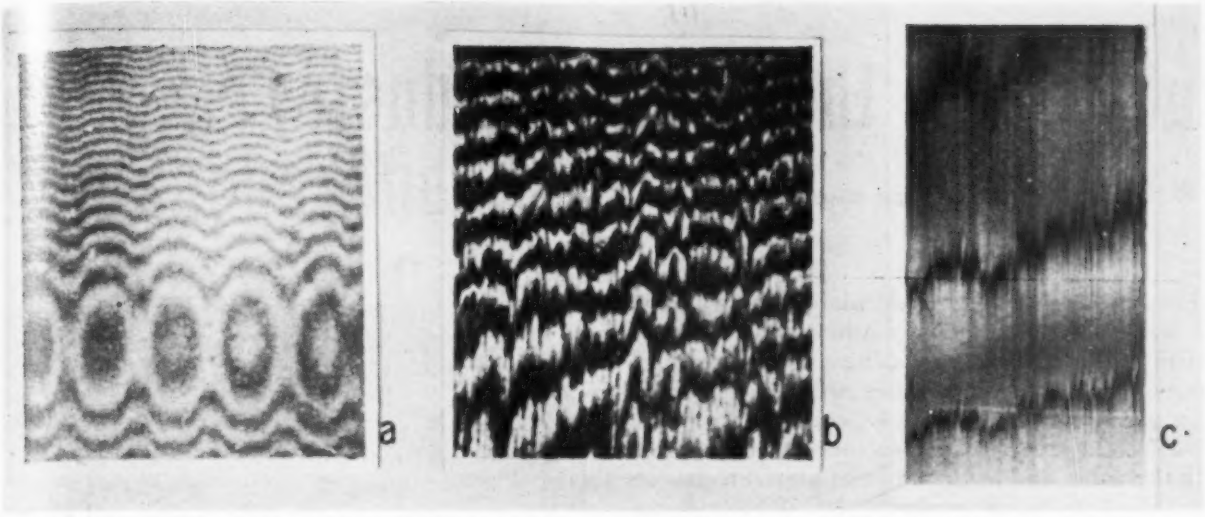


Figure 13. Interference fringes of (a) etched glass roughness standard, (b) railroad car journal viewed through concave lense, (c) highly polished slip gage[15]. (Magnification of (c) approx. 720 X)

clusions, intermediate crystal structures, and other inhomogeneities in the coating are generally sufficiently enlarged to allow their determination by taper sectioning.

Interferometric Studies

Interferometric methods are extremely sensitive and are primarily useful in the study of extremely fine surface changes. At their best, interferometric methods can resolve height differences smaller than 0.1 microinch.[15]

Interferometric studies are generally conducted in conjunction with a microscope such as is shown in Figure 12, in which a monochromatic light beam gives rise to a system of interference fringes between the rays reflected on a flat-parallel or plane-convex glass plate and the surface of the specimen which is being examined. When the paths of the rays reflected by the glass plate and by the surface differ from the value of the wavelength of light λ, or from $n\lambda$ multiples thereof, a dark fringe will appear.

Typical fringe patterns are shown in Figure 13. On the etched glass standard the groove depth is about 9 microinches, whereas on the axle journal the heights of the larger irregularities are within 10 microinches. On the highly polished standard slip gage the polishing marks amount to less than 1 microinch.

Interferometric methods are primarily useful in the study of highly polished surfaces. However, since analysis of the interference patterns is best performed on photomicrographs these methods are somewhat tedious.

Summary

The discussed methods represent only the major optical procedures. The most important characteristics of these methods are summarized in Table III.

Variations of these listed procedures are made at times. Moreover, each major method has its own individual merits. Thus, comparison among the various optical procedures is often difficult and may even be misleading. In many surface studies several different methods may be used which complement each other.

A number of additional optical methods have been developed or suggested. These, however, are not commonly employed because they either require complex procedures or do not reveal sufficient information useful to shop, industrial laboratory or research investigations.

(To be Continued)

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Publicizing the Plating Industry

By W. M. Phillips, *Research Lab. Div., General Motors Corp., Detroit, Mich.*

Electroplated finishes for many applications are seriously challenged by other types of protective or decorative coatings or materials. Future growth of the plating industry depends on a sound public relations program designed to make the average person better acquainted with the value and importance of plated finishes. The following article explains what is being done to promote public appreciation and understanding vital to the expansion of this industry.—ED.

THE idea of doing something concrete toward publicizing the electroplating industry took form well along in 1949, when an A.E.S. Public Relations Committee, under the writer's chairmanship, moved to get it started. This activity was made possible by funds, earmarked for this purpose, resulting from profits made at the two Metal Finishing Expositions held in Detroit and in Atlantic City.

The object of this activity is to promote the sale of electroplating by creating the in public mind a better appreciation of plated products, thus expanding the buying demand. The plating industry cannot stand still . . . it must either go forward or go backward. Most of the successful industries — as, for example, the plastics industry — constantly carry on public relations' activities to promote public demand for their products.

Conveyorized Plating Lines
SHINY auto parts of gleaming nickel and chrome now are electroplated by an automatic process that takes all the hand work out of the plating proper. Workmen rack up the pieces at the head of the conveyor line, they take them off and stockpile them at the finished end. Between those manual operations everything is automatic and mechanically timed.
Detroit shops originated plating to specification whereby a predetermined thickness of metal is deposited on base metals. Photo above shows the overhead conveyor on which the racked parts move as they are degreased, rinsed and then plated to specified thickness in the chromium plating tanks. They finally end their journey, ready for distribution, at the detracking terminal. The automotive industry has invested more than $200,000,000 in plating plants and equipment. Without such automatic, conveyorized plating lines, prices of cars would be much higher. Similar methods have spread to other industries lowering prices of items for home use.
More massive auto parts are completing their automatic trip by conveyor fully plated with copper, nickel and chromium. As many as 60,000 large parts are electroplated each day.
Page 18—June 4, 1950 The Detroit News Pictorial

Figure I. The reproduction herewith of picture showing the mass production of chromium-plated automotive bumpers and grills, along with caption content, as run in the Gravure section of the Detroit News (Circ-627,000) is another good example of the public relations' job being developed.

Figure II. The pictorial feature article from "Popular Science," above reproduced, on the Making of Tin Cans of Electrolytic Tinplate, is another excellent example of the Plating Industry's publicity activities. Circulation exceeds 1,100,000.

The committee fully realized the handicap it faced in instituting such an undertaking. The funds available for the purpose were not sufficient for a full-scale public relations program, with the result that the work was limited to providing editorial material for use in consumer magazines and, to some extent, in the daily press. The fund could not come even close to paying for any advertising or radio campaign. The results obtained during 1950 from this meager amount of available funds are largely attributable to our good fortune in securing the part-time editorial services of an experienced editorial and public relations man in the person of *S. E. Sangster*. Here, briefly, is an outline of what has been accomplished . . . a picture which we feel amply demonstrates that the desired result can be obtained, provided sufficient funds become available to enable the Committee to expand the effort.

Of the major illustrated plating articles that have appeared in the consumers' press, some have dealt with mass silverplating, while others described how today's automobile bumper evolved and the part plating plays in its protection and attractive appearance. Other automotive features dealt with the part plating plays in contributing to efficiency and longer life of many unseen parts of the car and engine. Others describe how electrolytic tinplate has replaced hot-dip tinplate in the manufacture of food cans, and its importance to the American housewife. Others have dealt, in non-technical popular form, with the importance of electroforming and plating to the production of electrotypes and in preparing copper cylinders for gravure printing. Other articles in a non-technical form, describing additional applications of plating that serve to provide better products at lessened cost, are scheduled for publication or being prepared for submission to magazine

(*Concluded on page 73*)

Continuous Anodizing of Aluminum Coiled Sheet

By Charles J. Simon, *Monarch Metal Weatherstrip Corp., St. Louis, Mo.*

THE continuous anodizing of aluminum coiled sheets as described in this article has been successfully accomplished over a period of years, beginning in 1939, by the *Monarch Metal Weatherstrip Corp.*, of St. Louis, Mo.

A continuous process is, of course, the only feasible and economical way to anodize the miles of thin sheet stock used in the manufacture of Monarch's weatherstrips. The anodic process creates a very hard, corundum-like surface, highly resistant to abrasion and the corrosive action of salt air and other atmospheric attacks, properties which are so important to metal weatherstrip.

The machine described was therefore born of necessity, rather than being an experimental project. The functions of this machine are not only to anodize, but also to clean, etch, seal in wax, and re-coil the sheet stock.

The range of the machine is four sheets .008" to .020" thick by 6" to 12" wide, and in the aluminum alloys 3S, 4S and 52S. The length of the machine is approximately 60 feet, and the width 10 feet.

The mechanical functions of the machine comprise a system of conveyor rolls made of materials that will withstand the various solutions. The conveying system has four separate lines, powered by a common driving member. The take-up rolls at the end of the process are also driven by the same power unit. Figure 1 is a plan of the complete installations.

Monarch's installation is entirely electrical, and is continuous to the extent that it runs 24 hours a day, six days a week. Riveting the tail of one coil of sheet to the beginning of another provides a really continuous process.

As the coiled sheet leaves the pay-off reel, it travels between felt pads which even the slight oil film that is on the metal as it comes from the rolling unit. (See Figure 2.) The pads also act as tension brakes to guide the sheets in a true course through the length of the entire machine. The sheet's speed through the machine is 3 feet per minute.

The first actual processing step in the machine is the cleaning and etching operation, which is carried out in a 500 gallon steel tank. The solution used is a proprietary alkaline cleaning and etching compound made to our own specifications. An auxiliary tank of the same size is located next to the main tank to pre-heat the next batch of cleaning solution. Each batch of solution is depleted in approximately 24 hours. Additions to the working solution are made each hour. A new solution is made up of 6 ounces per gallon of compound, and worked at 180° to 190°F. The sheet receives a two-minute clean and etch. As it passes from the cleaning and etching solution, it is sprayed with cold water to arrest chemical action and prevent staining. The next tank contains a still cold water rinse.

The sheets then continue on their journey passing

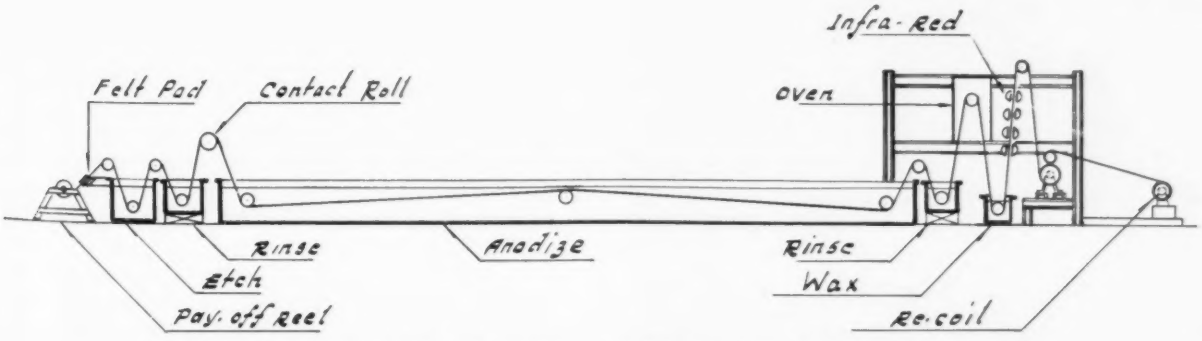

Figure 1. Schematic drawing of the continuous anodizing machine. Overall length is 60 feet.

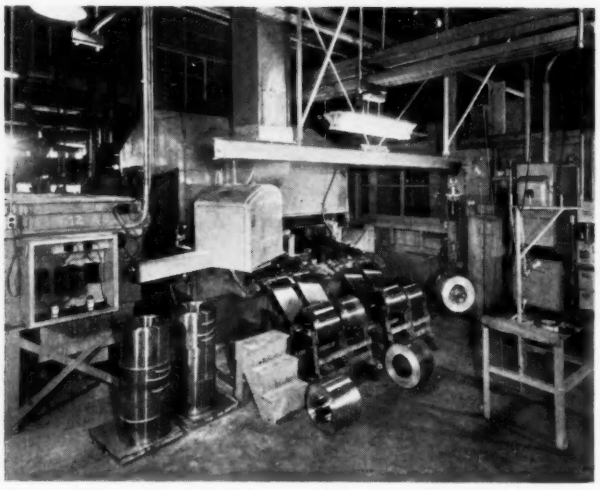

Figure 2. Starting end of process. Note felt pads for wiping strip as it enters machine.

over electric contact rolls, where the four moving sheets are charged with approximately 600 amperes on each sheet.

The anodizing tank is the next step for the sheet to pass through. The solution is a standard 15% sulphuric acid solution maintained at a temperature of 70°F., plus or minus 2°. This temperature is very important as it determines the density and hardness of the coating. The sheets are given a 10 minute anodizing treatment, and then travel into a cold water spray rinse.

Returning to the anodizing tank a moment, we might dwell a bit on some of its features. The anodizing tank itself is completely lead-lined and holds approximately 5,000 gallons of solution. The tank is 8 feet wide, 30 feet long, and 3 feet deep. Cooling of the solution is accomplished by direct refrigeration in the tank by lead coils. The entire interior of the tank is protected from short circuits by insulated grid work.

The anodizing unit of the machine is serviced by a 15 ton refrigerator and an 18 volt, 3,000 ampere motor generator set. (See Figure 3.)

After leaving the final cold water rinse, the sheet enters an oven operated at 220°F. This oven consists of a hot roll heated by electric strip heaters thermostatically controlled. Up to this point the sheets have been cleaned, etched, anodized and dried, and are now ready for sealing with a thin coating of wax, a patented process by the *Monarch Metal Weatherstrip Corporation*. The wax tank, which is next in the sequence of travel, is a small steel tank containing a mixture of 95% petroleum solvent and 5% wax. The dried sheets are passed through the wax tank in 10 to 15 seconds and continue on through a bank of infra-red drying lamps, which evaporate the petroleum solvent and leave the small amount of wax on the anodized surface.

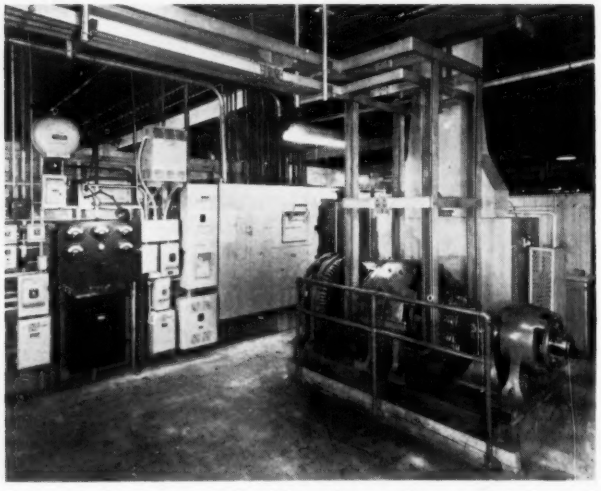

Figure 3. Generators and refrigerating equipment control panel.

At this point the sheet has essentially completed its trip, except that it is cooled and re-coiled into rolls. (See Figure 4.) This completes the anodizing process, and from here the strip is further processed into weatherstrips and various rolled sections.

In conclusion we might add that the machine is completely automatically controlled. The capacity of the machine is approximately 60,000 to 100,000 lbs. per month of completed coiled sheet stock.

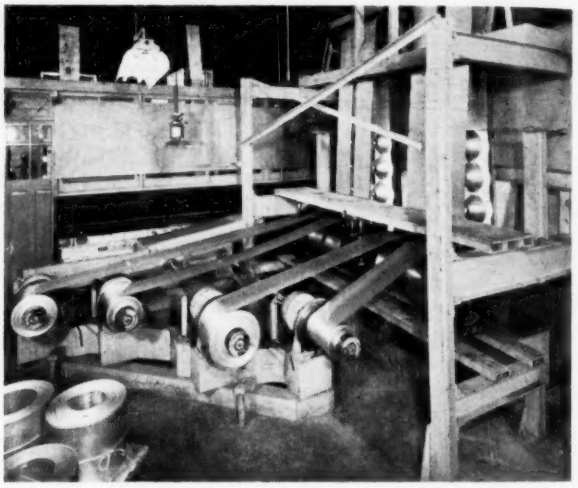

Figure 4. Finishing end and re-coiling units. Infra-red lamps at right dry wax coating.

A FIRST-AID STATION FOR THE SMALLER SHOP OR PLANT

Provision of first aid for on-the-job injuries is not as simple a matter for the smaller shop or plant as it is for the larger industrial establishment with 500 or more workers. Many smaller establishments have found difficulty in securing, at a reasonable per capita cost, the necessary equipment and the services of competent personnel.

Yet the problem is not insoluble, and the need is urgent. The smaller establishments far outnumber the larger, and the aggregate number of their employees is far greater than the total number of workers in establishments employing 500 or more.

In the small plant as well as in the large, the great majority of workers who come to the first-aid station are victims of minor injuries, many of which require no more than antiseptic to cleanse the wound, and a ready-to-apply adhesive bandage to keep it clean. It is a mistake, however, to consider such injuries unimportant. Most cases of serious infection stem from neglected minor wounds, and many injuries would

(*Concluded on page* 115)

Plating and Finishing Tubing at Spang-Chalfant

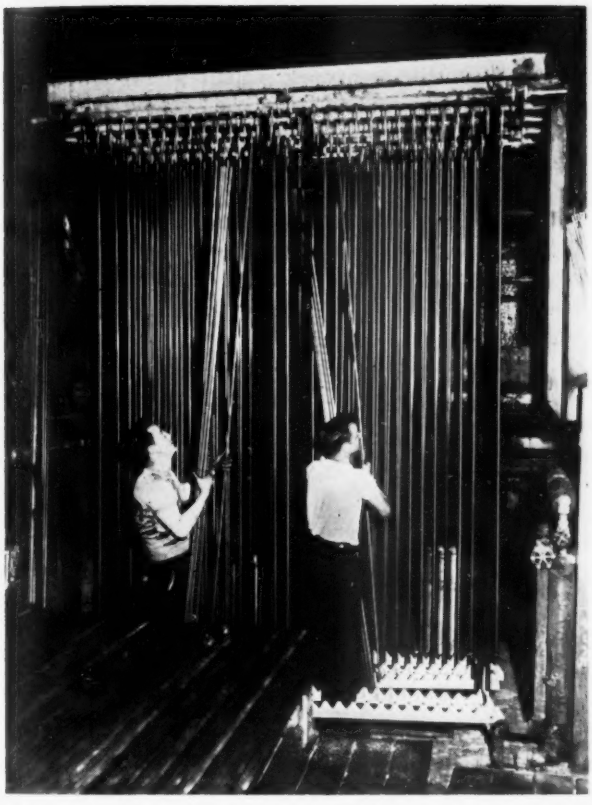

Figure 1. Loading tubing into cages which transport it through all plating operations.

AT the *National Supply Company*, a new product for the electrical industry, "Central" Electric-Metallic tubing, receives a complete exterior and interior surface finishing to give it added protection against the assaults of time and corrosive elements.

The tubing is made at the Etna, Pa. plant of National Supply's Spang-Chalfant Div. It is a lightweight steel conduit and is adaptable to a wide variety of electrical services.

Manufactured from cold strip, the tubing is made in an electric resistance-weld tube mill and cut off into 10-foot lengths. Then the ends are reamed and chamfered. The tubing is then ready for the surface finishing, consisting of zinc electroplating the exterior and lacquer coating the interior.

Figure 2. View of the finishing line at Spang-Chalfant.

To begin the finishing cycle, the tubing is loaded into cages which are suspended from a Mono-rail crane. The crane moves it from stage to stage until the cycle has been completed.

The tubing is first given a bath in sulphuric acid, then rinsed in water, and moved to the electroplating tank, where it receives an exterior coating of zinc. When the plating has been completed, the cage moves on to another clear water rinse, and then to an acid bath to brighten the finish. Before the tubing is removed from the cage it is given a hot water bath final rinse.

Unloaded onto an inside painting rack, the tubing is placed against nozzles which force a clear lacquer over the interior surface. It is removed from the nozzles and conveyed along racks past hot air fans, which dry this fresh lacquer coating.

Finally, the tubing arrives at the inspection table where the finishing job is thoroughly checked.

An Underwriters' Laboratory approval label is put on each piece, the tubing is bundled, and is ready for shipment.

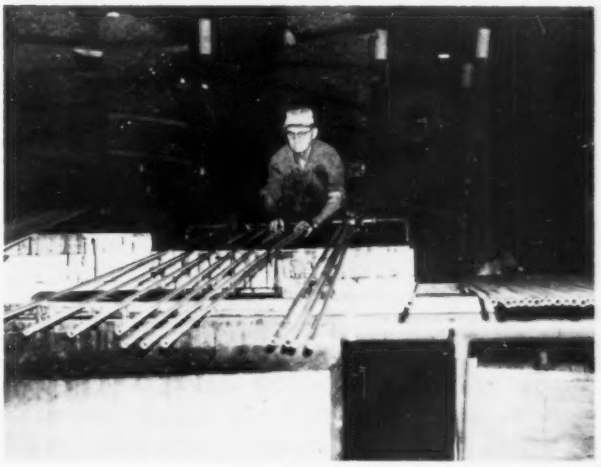

Figure 3. On this rack Spang-Chalfant's Electric Metallic Tubing receives its interior lacquer coating. The tubing is placed against the nozzles shown in background which force a clear lacquer through it. The operation is carried on at the company's Etna, Pa. plant where the tubing is made.

Nickel Salts from Nickel Anodes

Porous Pot Method

By Nathaniel Hall & G. B. Hogaboom, Jr., *Newark 2, N. J.*

THAT the market situation with respect to nickel sulfate and nickel chloride has been deteriorating progressively during the past eight months will come as no great surprise to the reader. It has now approached a point where platers shudder and turn pale at the thought of the consequences of a leak in the nickel tank or filter system. Closer attention to the efficient consumption of nickel anodes by plating no heavier than absolutely necessary, and precautions taken to minimize and recover drag-out losses have reduced requirements to some extent. Many platers, however, have been forced to supplement the reduced shipments from their regular suppliers by recourse to the open market, at prices which ranged as high as $1.60 per pound and which dropped to about 95¢ when the effective date approached of N. P. A. Order M-14, restricting uses of nickel for plating. The alternative, of course, was the commonly recommended expedient of operating at lower than usual concentrations, with resultant sacrifice of plating speed or brightness.

Since N. P. A. Order M-14 was amended February 28th, permitting the use of nickel anodes which were on hand on March 1st, for nickel plating beyond the original deadline, many platers are now in a position where, although they might have sufficient anodes to insure future operations, they are unable to purchase nickel sulfate and nickel chloride of guaranteed purity at legitimate prices in amounts sufficient to fill requirements.

When the tight market in nickel salts showed no signs of improving, the economics of nickel sulfate and nickel chloride production from nickel anodes was investigated and this, in turn, led to consideration of the porous pot method. The use of porous diaphragms for replenishing gold solutions is a very old art and, in recent years, their use for high speed plating has received serious attention by *Diggin* and *McCahan*, although the objective in the latter case has been to reduce roughness due to anode particles in the solution. Employment of such diaphragms, or "porous pots" as they are more generally known to platers, for the production of nickel sulfate and nickel chloride has been cautiously suggested recently, but few have been fully aware of the *practical* possibilities inherent in this procedure. It is the purpose of this article to describe the details of the process and the results obtained on an industrial scale, namely, the maintenance of a 2700 gallon semi-automatic bright nickel tank where production requirements would not permit operation at lower concentration and plating rate.

Using the Porous Pot

Reference to a table of electrochemical equivalents will indicate that nickel dissolves anodically at the rate of 1.095 grams per ampere-hour, or 3.9 ounces per 100 ampere-hours. This is equivalent to 15.8 oz. of nickel chloride ($NiCl_2.6H_2O$) or 17.5 oz. of nickel sulfate ($NiSO_4.6H_2O$). The estimated maintenance requirements of the plating tank, based on previous analyses, were 25 lbs. of nickel chloride and 125 lbs. of nickel sulfate per week, which would require the anodic dissolution of about 34 lbs. of nickel and 14,000 ampere-hours of direct current. Since the tank was employed on an eight hour basis, operation with porous pots for 16 hours during each 24 hour period would be permissable, the maintenance man being available on Saturday mornings to turn off the current, so that eighty hours were available per week for replenishment operation. The tank current required would, therefore, be 175 amperes.

For the sake of expediency a dozen porous pots

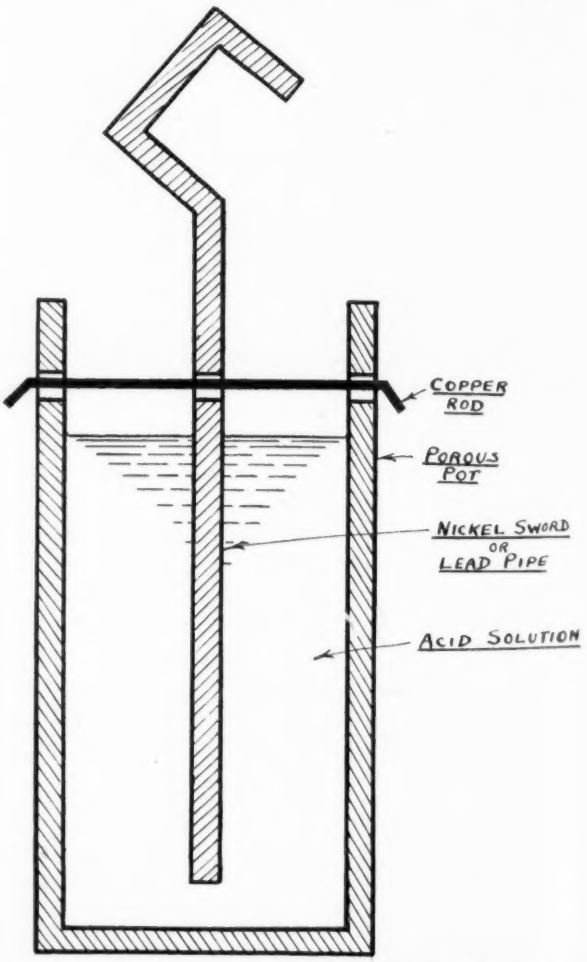

Figure 1. Schematic layout of the construction of a suitable porous pot for generating nickel sulfate or nickel chloride.

were obtained from stock at a local laboratory supply house.* The largest available size was 3″ in diameter by 7″ long, known as a "No. 8 Bottom Porous Cup" and costing about $1.25 each. Eight pots were assembled, as shown in Figure 1. Holes were carefully drilled on opposite sides a little below the top and also through a length of lead pipe bent at the top to form a hook. A piece of copper rod, one-eighth inch in diameter, which was on hand, was inserted through the holes and bent up at the ends to keep it in place. The pots were first filled with 500 ml. of 5% by volume sulfuric acid and were suspended from the conveyor arms of the plating unit without agitation. The current drawn per pot was about 7.5 amperes at 6 volts. By substituting 10% by volume sulfuric acid the current was doubled to about 15 amperes.

The four remaining pots were assembled as described above except that scrap nickel anode "spears" were employed as cathode instead of lead pipe, and 20% by volume technical grade muriatic acid added instead of 10% sulfuric acid. The current drawn was approximately the same but this type of cell would be preferable where only nickel chloride production was desired rather than nickel sulfate, as the cathode sludge which formed during operation, due to penetration of the diaphragm by nickel ions and appearing to be basic nickel compounds, would then contain only chloride.

At the end of four hours operation the catholyte was definitely green-colored and, after six hours, the amperage had dropped to about 25% of the original value while deposition of nickel on the cathode became appreciable. At this point the test was discontinued. The sulfuric acid concentration, by titration, was then 0.1% by volume so that the sludge, which is readily soluble, could be added to the plating solution without affecting the pH appreciably.

The preliminary test indicated that operation overnight would result in excessive deposition of nickel on the cathode. Operation for a 4 hour period, which appeared to be the maximum without nickel deposition, would require 48 pots. Although a timer could be installed on the rectifier to shut off the power at the end of a 4 hour period each night, maintenance of this large number of rather delicate units was considered to be excessive. We were finally able to procure** a "porous diaphragm cup," 6″ in diameter by 13″ long, at a cost of about $10.00 each. These drew about 100 amperes each, although nickel ion penetration and the four hour limitation before deposition on the cathode still existed.

Because of the fragility of the cups it would not be advisable to hang them on the conveyor arms of the plating unit during the working day. Some of the plating solution, therefore, was pumped into a small tank connected to the 6 volt bus bar system, and a few nickel anodes employed with the porous pots to produce sufficient salts for replenishment losses. The enriched solution, including the pot sludge, was pumped through the filter into the plating tank. Four 6″ x 13″ porous pots each operating at 100 amperes for two cycles per working day of 3½ hours of plating time plus ½ hour for maintenance could produce the required 34 lbs. of nickel (in the form of nickel sulfate and chloride) per week.

*Eimer and Amend, New York City, Catalogue No. 2-535.

**General Ceramic & Steatite Corp., Keasby, N. J.

Chemistry of the Process

According to the reaction:

$$Ni + 2HCl + 6H_2O = NiCl_2.6H_2O + H_2$$

it would be necessary to add 1.53 lbs. pure HCl for 5 lbs. of nickel chloride, which would be equivalent to 4¼ pints of 20° muriatic acid (31.5% HCl) or 3¾ pints of 22° muriatic acid (35.2% HCl).

In the same manner, according to the reaction:

$$Ni + H_2SO_4 + 6H_2O = NiSO_4.6H_2O + H_2$$

there would be required 9.3 lbs. pure H_2SO_4 for 25 lbs. of nickel sulfate, which would be equivalent to 7 pints of 60° sulfuric acid (77.7% H_2SO_4) or 5½ pints of 66° sulfuric acid (93.2% H_2SO_4). The acid employed in the porous pots should be subtracted from these figures if the contents are added to the plating tank.

In order to simplify calculations of acid required for different conditions of amperage and time, the following may be used to obtain the approximate amounts per 100 ampere-hours. However, it is suggested that somewhat less be added first, and the balance slowly thereafter to adjust the pH to the proper operating value.

20° muriatic acid	13½	fluid oz.
22° muriatic acid	12	" "
60° sulfuric acid	5	" "
66° sulfuric acid	4	" "

Operating Costs

a) *Power*: In the particular installation under discussion, the power rate is 2.5¢ per kilowatt hour. With the rectifier delivering 400 amperes at 6 volts and an estimated overall electrical efficiency of 50%, the power cost per 35-hour operating week would be

$$\frac{400 \times 6 \times 35}{0.50 \times 1{,}000} \times 0.025 = \$4.20$$

b) *Nickel*: During the 35 hour per week operating period, 34 lbs. of metallic nickel would be dissolved from the anodes. At an anode cost of 72¢ per pound the value of the nickel converted to salts would be $34 \times 0.72 = \$24.48$.

c) *Acid*: For the production of 25 lbs. of nickel chloride and 125 lbs. of nickel sulfate per week there would be required the addition of 50 lbs. of 66° sulfuric acid and 22 lbs. of 22° muriatic acid, the cost of which, in carboy lots, would be $50 \times 0.028 + 22 \times 0.032 = \$2.10$.

d) *Labor*: About 5 hours per week for preparation of the acid solution, filling and emptying the porous pots and transferring the plating solution. At $1.50 per hour, the cost would be about $7.50 per week.

The total cost for production of 125 lbs. of nickel sulfate and 25 lbs. of nickel chloride per week is, therefore, $38.28 or 25¢ per pound. It should be noted that this cost is based on 100% availability of the nickel content of the anodes which, if corrected for

(*Concluded on page 70*)

Quality Control in the Making of Plating Rectifiers

By Walter A. Raymond, *Engineering Editor*

WHILE rectifiers for plating have been in use for many years, and are now accepted on a par with motor generators for practically all applications, few platers realize the exacting nature of their manufacture and the high standards of performance built into a modern rectifier unit.

The earliest plating rectifiers were almost invariably spoken of as being "over rated." In all fairness to the manufacturers, a more correct statement would probably be that the intelligence of the plating operators, rather than the rectifier units, was "over rated." These early rectifiers were designed and built to deliver their rated output, under normal conditions, for long periods of time. As it turned out, most platers' ideas of "normal conditions" included frequent and often prolonged periods of operation at above-rated capacity, and in environments ideally suited to rapid corrosion and deterioration of the units. Inevitably, a considerable number of these early units were doomed to failure.

In the light of this experience, rectifiers have undergone a series of improvements over the years. Today rectifier manufacturers anticipate the abuse their equipment will get and "beef-up" their design accordingly to produce a dependable, long-lived source of power.

A typical illustration of the elaborate testing and quality control measures imposed on modern plating rectifiers before they are approved for shipment to a customer can be found at the plant of one of the many firms making such equipment.

This firm has developed an elaborate final test "torture chamber" apparatus for putting every completed rectifier unit through its paces, so that the customer is assured of a pre-tested and conservatively-rated unit.

This test apparatus is shown in Figures 1 and 2. During a test, the technician must check so many dials that it would make the average plater's head swim! A brief description of the various tests performed, and their significance to the operation and dependability of the rectifier, will help the plater appreciate the care taken in their making.

Illustrations Courtesy of Rapid Electric Co.

Figure 1. Showing a completed rectifier unit, at right, under test. The Chief Engineer at this firm personally supervises the final test on every finished rectifier.

Electrical Testing

Efficiency Test

This is defined technically as the ratio of output D.C. wattage (amperes X volts) to input A.C. wattage to the unit. In practical terms, it tells the plater how much of the actual kilowatt hours of purchased power that he feeds into the unit is transformed into usable plating power. It is a very important figure, although often overlooked or forgotten in the haste of an original purchase. For instance, a drop in over-all efficiency of 10% in a 1000 ampere, 6 volt plating rectifier can amount to an increase of approximately $40.00 per year in a firm's electric bill. Multiply this loss by the number of rectifiers usually found in the average shop and it is quickly seen that a poorly operating, low efficiency power source can eat a sizeable hole in the profits, in addition to the loss in production resulting from the reduced output.

By checking the output D.C. wattage of each unit, using various loads on the rectifier unit to simulate plating conditions, the percent efficiency of the unit can be checked over its entire operating range.

Overload Tests

Several types of tests are made to check the performance of the rectifier under conditions of severe overload. One type of overload test, called a "shock test," subjects the unit to a 100% current overload for 30 seconds at a time, at 3 minute intervals for 2 hours. The complete 2 hour cycle is controlled by automatic timers. Any stack or plate failure during this test can usually be detected audibly, but in any

...e can be quantatively checked by appropriate meters ... the test panel.

Another overload test is the steady 25% current ...erload test, where a load 25% over the rated capacity ... the rectifier is imposed steadily for a 2 hour period. Contact thermocouples on the rectifier plates and on the secondary side of the transformers indicate any temperature rise due to burning out of plates, shorting, failure of insulation, high resistance contacts, etc. In addition to temperature readings, each critical junction in the unit is felt by hand to check excessive temperature rise. It is interesting to note that while manufacturers of the rectifier plates have a 35°C. maximum temperature rise specification, this firm does not permit a rise over 25°C., as an extra safety margin. Similarly, Class B transformers (such as are used in these units) are designed to withstand an 80°C. rise in temperature, whereas the final unit specifications for this company limit this rise to 35°C. maximum.

It is important to note that the above overload tests are made with the rectifier unit connected to a load, corresponding to actual plating conditions where current is flowing through the unit.

Another overload test, called a voltage overload test because no current is being drawn, is also imposed on the units for 15 minutes. Failures from voltage overload are easily detected in this shorter time period. This type of test simulates what would happen if the rectifier was turned on, but not supplying current, when the A.C. line voltage surged up to 25% above the rated line voltage.

PHASE PROTECTOR TEST

Three-phase rectifiers are designed to shut off immediately in the event that one of the input A.C. phases goes off, which could happen if only a single one of the three fuses were to fail, thus severly overloading the other two phase circuits. The test panel shown in Figure 1 permits the removal of any one individual phase from the A.C. input side to check the operation of the phase protection circuit breaker.

VOLTAGE REGULATION TEST

To evaluate the stability of the voltage regulating circuit the output D.C. voltage of the units is also checked at no load and again at full load. On some rectifier designs and circuits not over a 15% change in voltage is permitted between the two extremes of loads. This is important to the plater for several reasons:

1—If the rectifier is used as a main source of D.C., with rheostats to each of several tanks, then he can be assured of a fairly stable voltage regardless of varying loads to any of the tanks connected to the line.

2—A steady voltage at the tank regardless of load changes insures a fairly constant flow of current and better plating control is inherent. Also, with a more constant current there is less waste of overplating due to excess voltage at the lesser loads.

FAN TESTS

The amount of cooling air drawn across the stack and transformer assemblies is also checked by measuring the air velocity at the exhaust outlet of the cabinet

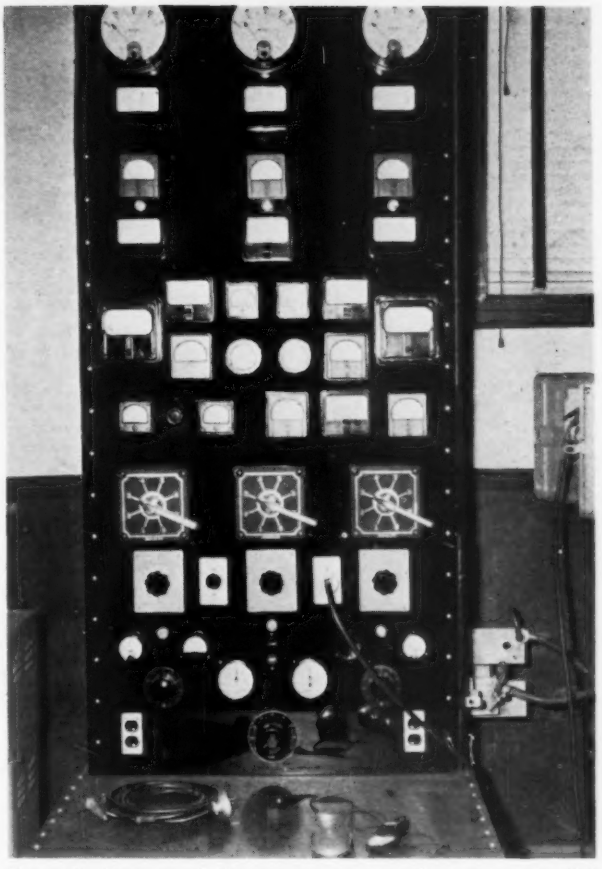

Figure 2. Close-up of the many meters on the test panel which quickly reveals any deficiencies in operation of the units.

as well as directly over each stack. This insures adequate and uniform cooling of each stack.

Miscellaneous Tests

In addition to the above tests, a number of lesser known, but equally important operational checks on the rectifier circuits are also made on the special test panel stand. The A.C. current from the transformer secondaries to each stack is checked and balanced to within ½% throughout the entire current range. This insures even distribution of current to the rectifier stacks and prevents excessive loading of any one stack. It also detects any unbalance in the transformers themselves.

Another test of considerable importance is the checking of the accuracy of the output voltmeter and ammeters on the rectifier against the highly standardized test panel meters, which are accurate to ±1%.

The amount of output ripple voltage of each phase, in a 3 phase rectifier, is determined on this equipment also. By first providing a standard, individually balanced input voltage and current in each of the three phases, the output ripple voltage at the rated load can be determined for each individual circuit. The amount of permissable ripple voltage will vary depending on the circuit used and whether the unit is single or three-phase powered. Limits range from 4½% for a 3-phase bridge circuit to 160% for a single phase, half wave circuit.

In some applications, high percentage of ripple is objectionable. Chromium, for instance, is a bath that produces higher quality plate with a lower percentage of ripple. Examples of that in the field are that single

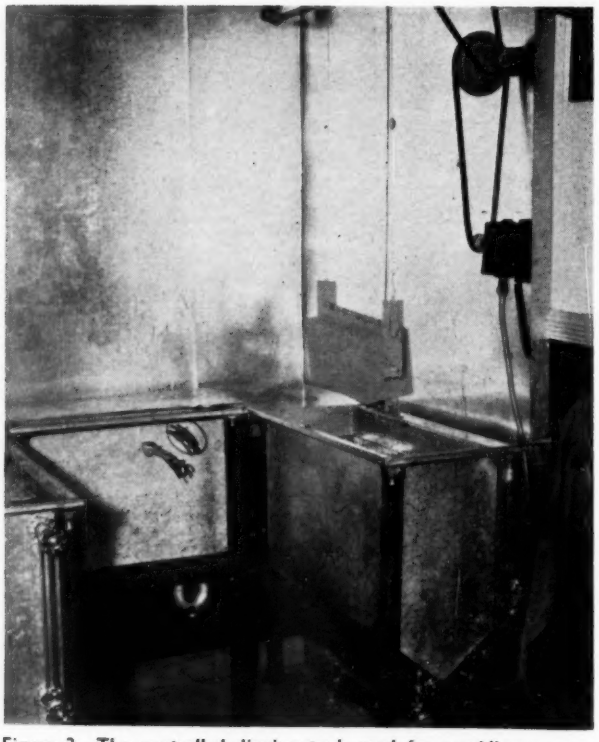

Figure 3. The controlled dipping tank used for providing a completely corrosion-proof coating on the rectifier stacks. This insures maximum service life in the corrosive atmospheres usually accompanying rectifier use.

phase units do not do as good a job in chromium (47% ripple) as the three-phase half-wave with an 18% ripple.

Where a high degree of accuracy in measuring ripple voltage is required, use is made of the cathode-ray oscilloscope. This determines not only percentage of ripple but also the wave shape. Wave shape distortion is also a clue to faulty operations or design.

Stack Coatings

One of the troublesome problems in rectifier development has been the lack of good compatible coating materials for protecting the selenium plates from corrosion and deterioration in the usual plating room atmosphere. After a long period of experimentation this firm has found what they consider to be the ideal coating. Laboratory tests and field experience have shown it to be far superior to any previous coating material they have tried. For best results with this coating, it has been found essential that two uniform coats be applied. In order to do this successfully in production, an ingenious timer-controlled dipping machine has been built (see Figure 3). This machine dips and removes the stacks from the coating material bath at a rate which gives a uniform, heavy film of protective coating. Once parts are placed in the dipping machine, they are taken through the cycle of dip, air-dry, re-dip, air-dry automatically. When required, a special fungus-proofing coating can also be applied over the regular coating.

The intricate final electrical test stand and the controlled-dipping machine for the stacks are good illustrations of the engineering skill and painstaking workmanship which goes into the making of a modern plating rectifier. Only by such care in manufacture can the rectifiers maintain their reputation as a dependable source of D.C. power.

NICKEL SALTS FROM NICKEL ANODES

(Concluded from page 67)

sludge content, would indicate a cost higher by a small amount. On the other hand the salts are calculated on the basis of theoretical metal content; for example, single nickel salts usually contain 21.5% metallic nickel whereas the theoretical nickel content of nickel sulfate ($NiSO_4 6H_2O$) is about 22.3%, so that one would correct the other. Also the cost figures do not include overhead and depreciation on the equipment used which will result in a small increase per pound of salts depending on the accounting procedure employed. On the whole, however, the production cost compares very favorably.

Comments

In the plant under study, an investment of about $50 for four porous pots and labor and other materials for fabricating the units, would result in a weekly saving of $100 over open market purchases at 95¢ per pound for salts. This also answers the question which has often been propounded recently, namely, which is more advisable when open market purchases are necessary, nickel anodes or nickel salts? With an asking price of 95¢ per pound for nickel salts, production of salts from anodes is more economical up to an anode price of about $3.50 per pound.

Variations of the procedure described in this report will, of course, immediately present themselves to the reader. The porous pots employed in the present instance are easily replaceable if cracked during handling or use and are not at all expensive. Practically any other size or shape of porous diaphragm which will fit in the tank conveniently may be employed, however, and any nickel diffusing into the cathode compartment can be returned to the plating solution. Anode stubs and other types of anode scrap can be used for the salt production by employing anode baskets, although it is not recommended that full length usable anodes be moved to and from the plating tank since sludge is dislodged from the anode bags with consequent rough nickel deposits. In non-automatic nickel tanks there is often sufficient space at the ends of the work rods to permit a few porous pots to be employed during the working cycle, although at reduced amperage because of the lower operating voltage.

Replenishment of nickel plating solutions by means of porous pots is not a procedure which would, ordinarily, be given any consideration at all. During the present emergency, however, it offers, for those who have sufficient anodes, the possibility of maintaining their solutions at optimum concentrations.

Acknowledgement

This report was made possible through the active cooperation of Messrs. Alfred and Gerald D'Agostino of *Alberts Plating Works, Inc.*, Brooklyn, N. Y., who contributed their plant facilities for the tests and assisted in the accumulation of the data. Their very helpful participation is gratefully acknowledged.

Controlled Materials Plan Starts July 1

THE National Production Authority, U. S. Department of Commerce, has formally announced that a *Controlled Materials Plan* will be placed in operation July 1, 1951, for defense production and certain defense-supporting activities vital to meeting rearmament needs.

CMP is a plan by which the three basic metals — steel, copper, and aluminum — are allotted directly to producers on the basis of detailed requirements, submitted in advance, for the manufacture of goods which the government needs for the defense program. CMP makes it possible to authorize specific production schedules and make firm allotments of the three basic metals needed to meet, but not exceed, direct defense and defense-supporting production and construction goals — on time and in the proper quantities.

Program Has Two Phases

The first phase of the CMP operation will be the reporting to NPA, by producers, of their detailed requirements for the basic materials, on forms which will be sent to them in May. The second phase will be the allotment of the specific amounts of materials to producers starting July 1, after determination by the Defense Production Administration of the necessary production programs.

Manufacturers of military products, products for the Atomic Energy Commission and certain defense-related construction projects will file their requirements under CMP regulations. Also required to file will be manufacturers of other products using steel, copper and aluminum, *excepting consumer durable goods*. This will be done in order that NPA can gauge their needs and measure the impact of the defense program on their production, whether it is under CMP or not.

Manufacturers of consumer durable goods *will not file requirements*, although final decisions have not been made on all items. Repair shops will not file, since they will be covered by a special CMP regulation which will assure them of needed materials without application to NPA. Manufacturers of repair and replacement parts will, however, be required to file with NPA.

The lists below are general and tentative. Definitive products lists, together with specific reporting instructions, have been sent to producers of these items. Informational material explaining the operations of business firms under the Controlled Materials Plan is also available to individual businessmen and to trade associations, chambers of commerce and other business service organizations. In addition, group meetings of businessmen with NPA officials administering the CMP program will be scheduled as necessary in various parts of the country to provide assistance in operating under the plan.

How CMP Operates

As in World War II, products programmed under the *Controlled Materials Plan* fall into two categories: "A" products and "B" products.

In general, "A" products are those where the most convenient method of production authorization is vertical. Producers of "A" products get their production authorizations and material allotments *from their customer*. A prime contractor's customer is a Government agency; a sub-contractor's is a prime contractor or another sub-contractor.

The "B" list programs will include certain products where it is most practicable to furnish authorizations horizontally, directly to the producer. In general, this list will include certain civilian-type products, industrial machinery and equipment, and components which are needed for defense. Producers on the "B" list will obtain their authorizations and allotment from their NPA Industry Division.

It is planned that *after the first quarter of operations*, CMP will be decentralized. In World War II it was found that, in the great majority of cases, CMP authorizations and allotments were best handled through field offices. Most producers will then apply to their local offices. This cuts down the paper work in Washington and saves producers time, trouble, and expense.

The Need for CMP

While the defense program now under way can be handled by a strong U. S. economy with far fewer pressures than existed in 1942, we cannot afford to take chances, to risk serious delays in the production of arms and essential expansion of our productive strength.

The early stages of the defense effort, launched last year required few controls. A simple priority system, using Defense Order (DO) ratings, made it possible to channel materials and equipment into defense production. But the impact of this defense program is mounting. As blueprints and orders are increasingly translated into actual production and actual consumption of basic materials, CMP will provide a continuation of the orderly flow of materials and production of the things needed — on time in the right quantities — for defense and for defense supporting programs.

Advantages of CMP

In essence, CMP is a simple plan — a tested method for authorizing and assuring the production of defense and defense-supporting items. With CMP, the NPA will tell producers what the Government has to have; it will furnish the timetable for getting things done, and it will give producers the authority to carry out the program. This authority is expressed in terms of an authorized production schedule to obtain and use controlled materials and a preference rating on other materials and components needed to complete the job. The authorization or allotment of steel, copper or aluminum under the Controlled Materials Plan is not a hunting license; it is a cashier's check on the known supply.

The Controlled Materials Plan is workable, as demonstrated in World War II, because it is a quantitative plan. It makes it possible to combine a wide range of essential needs into a common language, a common denominator and then match up needs with supply accurately. The common denominators under the Controlled Materials Plan are the basic metals — steel, copper and its alloys, and aluminum. One or all of these materials are used in nearly all "hard goods" production, and their forms and shapes can be traced and measured back to the facilities that produce them.

The Controlled Materials Plan has the advantage of minimizing the need for centralized planning and supervision, by closely following the normal "chain of command" in industry. A major share of the responsibility for getting out the necessary production is left to industry. It will be up to the producer with a tank contract, for example, to allot controlled materials to his sub-contractors and schedule production so that all the thousands of parts and components that make up a tank are ready on time and in the right quantities. (The exception is certain common components which are in such great demand that special programs will be devised by NPA to assure their availability.)

A Flexible Plan

The flexibility of the Controlled Materials Plan is particularly suited to today's dual economy. Defense production can be insured through Controlled Materials Plan authorization. Civilian production is encouraged rather than discouraged.

For the time being, at least, the Controlled Materials Plan will be limited to defense production, and to a relatively few special programs for production of vitally needed defense-supporting items. Thus, while exact information is not yet complete, the present program for defense and defense-supporting production will not require the whole supply of basic controlled materials. There will be, in fact, a substantial balance of steel, copper and aluminum available for non-defense use. This balance of materials, after allotments under CMP, will be available for non-defense production. A rough balance between supply and demand for the left-over balance will be preserved by using other NPA powers, such as "M" or limitation orders, to reduce less essential civilian production and assure a proportionate amount of materials will be available for civilian business, large or small.

What CMP Can't Do

While the Controlled Materials Plan is the best plan yet developed to assure that essential production can forge ahead with minimum delay and disturbance, *it is no miracle plan, no cure-all.* It cannot itself increase the total supply of steel, copper or aluminum; it cannot eliminate all hardships throughout industry; it is no substitute for the enterprise and ingenuity of the businessmen.

Every effort will be made by NPA to get the job done with a minimum of control and to see that all business receives fair treatment. Regulations will be readied to prevent abuses, to rule out hoarding of scarce materials, and to provide help to small producers and service shops.

However any program seeking to control or re-direct the vast U. S. economy is bound to carry its quota of dislocation, temporary hardship and the inconvenience of some paperwork. This will be especially true at the outset. It is the considered opinion of officials in Government and those in industry who are familiar with CMP experience in World War II that the advantages far outweigh any disadvantages.

Time Available for Business To Get Ready

Producers affected by the Controlled Materials Plan will have plenty of time to brief themselves on procedures and regulations and be ready to operate under the Controlled Materials Plan after July 1. Forms, operating instructions and the official "B" list will be made available by May 1, 1951, so that producers coming under Controlled Materials Plan programs will have two months to prepare.

Copies of regulations and procedural forms will be available to businessmen through the Department of Commerce in Washington and its field offices and through national trade associations and similar groups.

Tentative List of Products for Which Application Forms Will be Required

Agricultural machinery; construction and mining machinery; oil field machinery; machine tools, metal working machinery and accessories, including welding and cutting apparatus; steam engines, steam and hydraulic turbines; pumps and compressors; conveyors and conveying equipment; elevators and escalators; fans and blowers, industrial; industrial trucks and tractors; mechanical power transmission equipment; heat exchangers, condensers, packaging machines, centrifugals and separators; hydraulic jacks and lubricating devices; motors and generators; switch gear and electrical control apparatus; electrical welding apparatus, including electrodes and welding rods; ships and vessels; locomotives; railroad and street cars; tractors; tin cans; fabricated structural steel products; tanks, boilers and cylinders; stamped and pressed metal products; valves and fittings; anti-friction bearings; food products machinery; textile machinery; woodworking machinery; paper making machinery; printing and publishing machinery; special industrial machinery, such as rubber, plastics, chemical, foundry, tobacco, glass, cotton, clay, cement, concrete products, etc.; aircraft and aircraft parts; truck trailers; metal shipping containers; screw machine products; industrial fur-

naces and ovens; mechanical stokers; office machines; scales and balances; commercial laundry and dry cleaning machinery; sewing machines except household; vacuum cleaners except household; refrigeration and air conditioning equipment, except household refrigerators and freezers and comfort air conditioning; measuring and dispensing pumps and lubrication equipment; commercial service equipment except household types; electrical wiring devices and supplies; carbon and graphite products; electrical indicating and measuring instruments; lighting fixtures; tacks, staples and cut nails and spikes; wire work products, such as wire cloth, wire chain and wire springs; safes and vaults; steel springs; bolts, nuts, rivets and other industrial fasteners; collapsible tubes; internal combustion engines; transformers; capacitors, rectifiers, induction and dielectric heating units; electrical accessory equipment for internal combustion engines; electric lamps, incandescent and fluorescent; radio, radar and television equipment, except home type; radio tubes; telephone and telegraph communication equipment; storage batteries; primary batteries, dry and wet; x-ray and therapeutic apparatus; motor vehicles except passenger type; small arms; small arms ammunition; cooperage; millwork, such as door frames, windows, etc.; prefabricated wooden buildings; fruit and vegetable baskets; wooden boxes; lasts; wood products such as ladders, tool handles, etc.; mattress and bed springs; wood office furniture; metal office furniture; furniture for schools, churches, etc.; professional furniture for laboratories, hospitals, but not beauty shop or barber shop; partitions, lockers and shelving; window and door screens; restaurant furniture; paperboard boxes; fiber cans, tubes and drums; periodicals; books; commercial printing; loose leaf binders; tires and inner tubes; rubber footwear; mechanical rubber goods; leather belting; shoe findings; luggage; saddlery and harness; flat glass products; concrete products (reinforced); abrasive products; insulation, packing and gaskets; cutlery; edge tools; hand tools; files and rasps; hand saws and blades; other hardware; plumbing fixtures; oil burners; heating and cooking equipment except residential; metal doors and sash, frame, etc.; sheet metal products such as roofing, culverts, etc., except awnings and radiator enclosures; farm wagons, wheel barrows and hand carts; aircraft, scientific and surveying instruments; mechanical measuring and controlling instruments; optical instruments and goods; dental, surgical and medical instruments and appliances; photographic equipment; clocks and watches; pens and pencils; marking devices; buttons, needles, pins and fasteners; brooms and brushes; morticians' goods; fire fighting equipment; repair and replacement parts.

Tentative List of Products for Which Applications Are Not Required

Motor vehicles—passenger type; household refrigerators and freezers and comfort air conditioning; heating and cooking equipment—residential; household electrical appliances; vending and amusement machines; sewing machines—household; vacuum cleaners—household; home radio and television sets; automobile trailers (not incl. truck or house trailers); sheet metal awnings and radiator enclosures; venetian blinds; household furniture; professional furniture for beauty and barber shops; window shades; women's hand bags; small leather goods; household stamped and pressed metal products (including enameled); domestic laundry machinery; household service equipment, such as dishwashing machines, water softeners, polishing machines; motorcycles and bicycles; jewelry and jewelry findings, silver and plated ware; pianos, organs, musical instruments and parts; games and toys, children's vehicles; dolls; sporting and athletic goods; artist materials; costume jewelry; artificial flowers; lamp shades; barber and beauty shop equipment; signs and advertising displays; umbrellas and canes; cigarette holders and tobacco pipes; soda fountain and beer dispensing equipment.

PUBLICIZING THE PLATING INDUSTRY

(*Concluded from page* 62)

editors. Too, newspaper releases of numerous short "fillers" descriptive of facts about electroplating are periodically being sent to over 300 daily newspapers. Many of these "briefs" are turning up in our press clippings.

Over 28 popular magazines have so far carried such feature illustrated material. Included among these might be mentioned *Popular Science Monthly* (2 major features, one on silverplating and one on the tin can), *Motor News, Quick, Think,* and several of the major metropolitan Sunday gravure magazines. Other material has appeared in such important trade publications as *Steel, Iron Age, Automotive News, Product Engineer,* the *Michigan Manufacturer,* the *Graphic Arts Monthly, American Metal Market,* etc. News releases of plating briefs in a growing list of newspapers are also playing a major part in reaching the general public.

Up to the end of 1950 a total reader circulation in excess of 8 million has been reached. Basing the value of the space obtained at normal advertising rates, this would have cost more than $100,000, yet the total Committee expenditure as of the start of this year was but $7,500.

Last December members of the *International Fellowship Club,* made up of suppliers and manufacturers of plating equipment and materials, were invited to a meeting with the committee at the Detroit Athletic Club to discuss ways and means of providing funds for continuing the important work of the committee. The I.F.C. agreed to take up the matter of providing financial assistance for the public relations program at their annual meeting to be held at the time of the annual A.E.S. Convention in Buffalo. It is expected that the Committee will also be re-organized at that time on a permanent basis and a broad program outlined and scheduled. Among the Fellowship Club members active in this work are *Tom Trumbour, Gus Munning, Doug MacDermid, Lou Hague, Manson Glover, Joe Leete, Dave Clarin, Lindy Lindahl,* and *George Nankervis.*

It is felt that in the period of change from civilian to defense production a good public relations' activity will pay off in immediate gains to the plating industry, not to mention the long-range possibilities, which so far have not been recognized by the rank and file of the industry.

NPA Rulings Affecting the Plating Industry

Several important changes in the regulations for plating have been made by the National Production Authority. These changes are detailed in the following paragraphs:

Cadmium

(NPA M-19)
Amended March 16, 1951

Lock washers and radio-television chassis have been added to the list of items which can be plated with cadmium, as have also high-carbon wire for carding, and twisters for synthetic yarn and cotton. (See the February, 1951 issue of *Metal Finishing* for the complete list of permitted items.)

Tin

(NPA M-8)
Amended April 2, 1951

This amendment makes it possible for tin *suppliers* to anticipate needs of their customers, and allows the suppliers to order materials ahead. Formerly it was necessary to have a certificate from the user before supplies could be ordered. This change is intended to smooth out distribution problems.

Copper

(NPA M-12)

The amendment of March 9 cuts the copper usage to 75% of the average for the base period, for the quarter commencing on April 1, 1951. Previously, platers could use up to 80% of the amount they used during the base period.

List B has also been revised, as shown below. Where copper plating is permitted on List B items (see each item), any copper held in the plater's inventory as of April 1st can be used for that purpose.

List B

Copper may *not* be used to produce or plate items on this list except as specifically noted.

Builders' Hardware

Protective brass plating of all listed items of builders' hardware is permitted where other types of finishes are not practicable.
Door knobs.
Letter slots.

Building Materials

Facias: Fittings for underfloor raceway systems.
Flashings (except (1) cap and base flashing for built-up roofing, (2) through-wall flashing in parapet walls, (3) flashing for chimneys, vent stacks and all other vertical surfaces rising through roof levels, (4) roof-to-side wall flashing, (5) valley flashing for slate, tile and cement shingle roofs, (6) door and window head flashing, (7) expansion joint flashing)
Gravel stops.
Shower pans.
Terrazzo strips.
Fins for: Unit heaters, unit ventilators, unit ventilator inlet wall boxes and convectors, and blast heating coils, or any apparatus using such coils as part of its construction.

Civilian-Type Motor Vehicle

Passenger automobiles including Taxicabs, Station Wagons, Ambulances, Hearses, Trucks, Truck Tractors, Truck Trailers, Motorcycles and Buses.
Hubcaps (except for plating).
Radio antennae for vehicles.
Sidewalk or curbstone warning devices for automobiles.

Clothing and Dress Accessories, not Including Safety Equipment

*Slide fasteners (zippers) (except (1) for the following functional components: slider bodies, separating end-components and top and bottom stops; and (2) except for applications in safety garments, work clothing, rubber footwear, foundation and surgical garments were necessary for reasons of strength, launderability and anti-corrosion).

Furnishings and Equipment

Refrigerator and water heater installation connections (except for high pressure LPG connections from tank to fixture).

Furniture and Fixtures

Fittings (except hospital and laboratory).

Hardware, Miscellaneous

Tags for pets.

Household Electrical Appliances

(Except for operational parts where the properties supplied by the copper are essential or where necessary for electrical conductivity)
Coffee makers.
Home and farm freezers.
Ice cream freezers.
Waffle irons.

Refrigeration and Air Conditioning Machinery and Equipment

(Commercial and Industrial)
(Except where copper products or copper-base alloy products are essential for the following: carbonators, complete condensing units less condensers, dehydrators, draft arms for soda fountain equipment, electrical controls and wiring, fittings, protective coatings, refrigerant circuits, refrigerant connections between compressor and cooling coils, refrigerant flow control valves, sight glasses, soldering and brazing materials, strainers, suction line heat exchangers, tube sheets, valves, water cooler low sides and pre-coolers, water flow control valves and water spray nozzles for evaporative condensers, evaporative coolers, and air washers)

Commercial and industrial refrigeration and air conditioning machinery and equipment including but not limited to:

Air conditioning systems, self-contained or remote.
Air washers.
Blast coolers.
Blast freezers.
Bottled beverage coolers.
Carbonated beverage dispensing systems (except coin operated).
Compressor stop valves (except valve seats, gaskets, bonnets, discs, disc screens, and protective coverings for valve stems).
Evaporative condensers.
Evaporative coolers (desert type).
Finned air-cooled condensers except those used for hermetic systems where the condenser is exposed to the outside air or for transportation systems.
Finned coils or evaporators.
Florist refrigerators.
Fountainettes.
Frozen food cabinets.
Ice cream cabinets.
Ice cube makers.
Malt beverage dispensing systems.
Mortuary refrigerators.
Non-carbonated beverage dispensing systems (except coin operated).
Packaged air conditioners (room, window, and store coolers).
Reach-in refrigerators.
Refrigerated display cases.
Refrigeration systems, self-contained or remote.
Reverse cycle heating and air conditioning systems (heat pumps).
Sandwich units.

Shell and tube or shell and coil condensers (except water courses, either straight or finned tube, where the refrigerant is in contact with the tube).
Shell and tube or shell and coil water chillers (except water courses, either straight or finned tube, where the refrigerant is in contact with the tube).
Soda fountains.
Space coolers.
Unit coolers.
Walk-in refrigerators.
Water coolers (except bubblers, bubbler connections, faucets and faucet connections).

MISCELLANEOUS

Ball point pens (except necessary operational parts).
Dehumidifiers for home and office use (except operational parts where the properties supplied by the copper are essential or where necessary for electrical conductivity).
Flashlight cases (except contact points for carrying current).
Garment hangers.
Hollow ware (except for hotels, restaurants, institutions and ecclesiastical use).
Identification and directional signs (except current-carrying parts).
Key chains and catches and fasteners therefor.
Lawn sprinklers (except working parts and propellers).
Outboard motors (except for operational parts).
Portable electric lanterns, such as railroad, miners' and industrial (except parts for conducting electricity and for plating).
Shells and caps for sockets.
Ties (except for explosives and other products where the properties supplied by copper are essential).

Nickel

(NPA M-14)
Amended March 31, 1951

This latest amendment adds a new List B of items for which nickel *cannot* be used. It also revises List A.

It continues the total usage figure at 65% of the average for the base period on non-rated orders.

LIST A

The following items may *not* be nickel plated, except as specially noted after each item, unless the nickel anodes were contained in the plater's inventory as of March 1st, 1951.

COMMUNICATIONS

Escutcheon plates.
Knobs.
Name plates.
Radio and television, decorative trim.
Speaker grilles.

HARDWARE

Bells.
Boat trim and accessories.
Builders' finishing hardware (except half trim for bathroom and toilet side of door).
Casket hardware.
Chimes.
Curtain hooks.
Door catches.
Door knobs.
Door knockers.
Drawer pulls.
Harnesses.
Hinges.
Kick plates.
Leashes.
Letter boxes.
Locks.
Luggage hardware.
Nails.
Picture frames.
Picture hangers.
Push plates.
Screen door and window hardware exclusive of screen.
Screws.
Switch plates.
Tacks.
Valve handles (except for bathroom and kitchen fixtures).

HOUSEHOLD APPLIANCES

(Except parts subject to abrasion or heat and except the strike prior to silver plating or vitreous enameling):

Including but not limited to:

Food mixers.
Heaters.
Polishers.
Refrigerators (except shelving and door handles).
Washing machines.
Waxers.
Vacuum cleaners (except runners).

JEWELRY—CLOCKS

Alarm clocks (except for internal parts).
Clocks (except for internal parts).
Costume jewelry (except for 0.0001 inch thickness or less as an undercoating for gold, silver or platinum-group metals).
Trim and optical glasses (except frames).

METAL FURNITURE AND FIXTURES

Commercial furniture, all decorative parts.
Electrical fixtures.
Home furniture, all decorative parts.
Napkin dispensers.
Store display cases.
Store fixtures.
Straw dispensers.

MOTOR VEHICLES

Accessories.
Dash panels (including instruments, controls and appearance items mounted in or on dash panels).
Escutcheon plates.
Gas caps.
Gravel guards.
Grilles.
Horns.
Interior trim.
Lamp housing.
License frames.
Name plates.
Ornamental trim around windows.
Radiator trim.
Trim rings.
Wheel discs.
All other parts (except for window frames and slide channels, external and internal door handles, ventilator and regulator handles for windows and doors, the bumpers, bumper guards, bumper bolts, rear deck handles, windshield wiper assemblies, hub caps and exposed screws where no satisfactory substitutes are practicable. The nickel employed for protection of bumper guards and bumpers should not exceed that amount equivalent to an average thickness of .001" on outside surfaces).

NOVELTIES

Ash trays.
Coasters.
Cocktail shakers and accessories.
Clothing ornamentation.
Cosmetic containers.
Hair curlers.
Handbag trim.
Humidors.
Ornamental buttons.
Smoking stands.

PLUMBING

Basin supports.
Cabinet trim.
Soap dishes.
Shower curtain rods and rings.
Shower doors and trim.
Tooth brush holders.
Towel racks.
Tumbler holders.

SHEET, STRIP AND WIRE PRODUCTS

All decorative parts fabricated from plated sheets, strips or wire.
Bird cages.
Clothes hangers.
Display stands.
Lamp shades.
Shopping carts.

TOOLS

Drills.
Flexible metal tapes (except measuring tape).
Hammers.
Office machines and business machines, decorative trim.
Planes.
Pliers.
Power tools (except for functional parts).
Punches.
Rules.
Saws.
Screw drivers.
Wrenches.

TOYS

Mechanical toys.
Pistols.
Toys.
Trains.
Tricycles.
Wagons.

UTENSILS

(Except the strike necessary prior to silver plating or vitreous enameling):

Flatware.
Hollow ware (except for hotels, restaurants, institutions, or ecclesiastical use).
Serving dishes.
Serving utensils.
Racks.
Trays.

(*Continued on page* 111)

Shop Problems

Abrasive Methods—Surface Treatments—Control
Electroplating—Cleaning—Pickling—Testing

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Imitation Plated Finishes

Question: Recently we have seen a number of small costume jewelry parts, both in plastic and slush metal, finished with a bright finish that was claimed to have been sprayed on instead of being plated. The finish was bright and lustrous, similar to bright chrome. There were also some parts with a bright gold and a reddish colored finish. Can you give us any information on how this type of finish is applied?

M. P. I.

Answer: The parts in question were undoubtedly finished by a method involving a brilliant silver spray coating. To produce this finish, the plastic or slush metal parts are first sprayed with a coat of rather heavy bodied lacquer to provide a smooth undersurface without any buffing or barrel burnishing being required. After this first undercoat is applied (and baked in the case of some slush metal parts) the silver coating is applied from a special type of spray gun, using a silver nitrate solution and a reducer solution. This deposits a very thin, bright silver film on the parts, which are then dried and coated with a top coat of lacquer. This final coat can be tinted to resemble gold, or any other shade, such as the reddish color mentioned above. The resulting finish is a bright and lustrous surface showing through the top coat of lacquer.

In using this finish, it is important to remember that the silver film is extremely thin and fragile, therefore the life and durability of such a finish will depend almost entirely on the durability of the top-coat lacquer.

Heavy Silver Plating

Question: Can you give us any information on the practicability of building up silver plating to a thickness of .025-.030" on brass parts. We have run into the problem of treeing and porosity when we attempted such heavy deposits, and wonder if anyone has been able to do this successfully. It is necessary that the deposit be capable of being machined.

S. R. J.

Answer: Our Guidebook - Directory contains a section on heavy silver plating, which should be helpful. It should be possible to produce such heavy deposits in a sound, machineable condition by using periodic-reverse current plating techniques, together with adequate cathode or solution agitation and high-concentration silver plating baths. Plating rates as high as .015" per hour may be realized in this manner. Depending on the shape of the parts, it may also be necessary to use special conforming anodes to promote even plate distribution and eliminate treeing.

Rough Plating

Question: We are having trouble periodically with nickel plating. Our anodes are bagged, and we believe that the rest of our practice is careful enough to prevent this trouble, but it crops up every once in a while and then disappears without our ever finding out the cause. We have noticed that after fishing up any parts that have fallen off the racks into the bottom of the tank our trouble seems to start, and we are about ready to conclude that we would be better off to leave the lost parts at the bottom. We filter the bath every week-end also. If you can give us any suggestions on this you will be making the lives of a couple of gray-haired platers a little more pleasant.

W. A. F.

Answer: Your trouble would seem to be connected with the lifting out of any dropped parts, so it seems logical that you might also be stirring up some sludge from the tank bottom at the same time. There may also be some loosely adherent deposits on the dropped parts that could come off as they were being removed from the tank. The way to overcome this problem is of course by continuous filtration of the bath, after first removing the solution to a separate tank and cleaning out any bottom sludge, followed by filtration of the solution back into the cleaned tank. If continuous filtration cannot be used, you can alleviate the problem by using a false bottom (screen) on the tank bottom that will catch any dropped parts and keep them out of any sludge that may be present.

Dummy Plating Impurities

Question: In dummy plating out the impurities from our nickel solution we seem to be getting a fairly good deposit of nickel on the dummies. At least it looks like metallic nickel, and is as hard as our regular deposits. Our plater tells us that we are wasting nickel doing this, and as wasting nickel at this time is the last thing we want to do, we would appreciate any suggestion that you could make. We dummy at about 5 a.s.f. overnight.

W. P.

Answer: When the dummy plating is properly carried out, the deposit obtained on the cathode should be fairly dark in appearance. You are probably plating at too high a current density, and it is suggested that you check the accuracy of the ammeter on your tank. Regular plating ammeters calibrated for high current for

regular plating are often quite inaccurate at the low range used for dummy plating . . . It is convenient to have a multiple-range meter on the control panel which can be switched from the high to low range as required. It is also possible that you do not have sufficient circulation of the solution past the cathodes during the dummying period.

Sulfuric Acid-Resistant Plastic

Question: We have a problem involving the use of a 10% solution of sulfuric acid at its boiling point, and have experienced trouble in obtaining a material which will stand up as a container for the mixture. The ideal material for our use would be some kind of plastic or coating material. Can you suggest something that might be successful in this application?

H. R. H.

Answer: About the only plastic material that would hold up at such a high temperature would be the newly developed tetrafluoroethylene type of compound. This is available also as a coating liquid that can be applied by spraying, giving films that are extremely resistant to all kinds of chemicals, including strong acid solutions. At present the price of the material is also extremely high, but for special applications it may warrant its extra cost. At present it is also under N.P.A. limitations.

Discoloration of Pitted Brass Castings

Question: Recently we were given some brass parts to finish, and we noticed that many copper-colored spots existed around the pits of the metal surface. We had a lot of trouble getting rid of these spots, finally resorting to lightly polishing them out. Can you suggest any reason why these spots should have been present and how we can better get rid of them?

B. A. W.

Answer: We are of the opinion that the copper-colored spots were the result of bright dipping the parts. During this operation some acid is trapped in the pits and later exudes to the surface, causing the copper stain.

This problem always exists with pitted or porous metals, but it can be minimized by thorough rinsing after the acid treatment or by a neutralizing dip. To remove the reddish spots, a short reverse current treatment in a solution of sodium cyanide can be used.

Classification of Operating Supplies in Nickel Plating

Question: We note that in your recent article on NPA rulings you state that nickel anodes are not classified as "Operating Supplies." You cannot operate a nickel bath without them, so we cannot understand why this interpretation is arrived at. Any information will be most helpful.

W. D. C.

Answer: The NPA considers that any material that appears in the final product should not be classed as an operating supply. In the case of nickel anodes, they become indirectly a final part of the manufactured article as a plated coating. For this reason they may not be classed under "Operating Supplies."

Heavy Gold Deposits

Question: We have a job requiring a gold deposit from .003-.005" thick, and would appreciate any information you could give us on it.

W. H. C.

Answer: There is no particular problem involved in depositing this much gold from a plating bath, although some extra attention must be paid to bath concentration, agitation, racking methods, etc., to insure that the coating will be uniformly distributed and smooth. Sufficient current and time will do the rest.

The Guidebook-Directory gives helpful details on heavy gold plating including the use of periodic-reverse current, which is helpful in obtaining uniform deposits.

PROFESSIONAL DIRECTORY

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Headquarters of
"ELECTROPLATING KNOW HOW"
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PATENTS

Recently Granted Patents
in the Metal Finishing Field

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Manufacture of Selenium Rectifiers

U. S. Patent 2,524,270. *L. S. Pelfrey, assignor to Sylvania Electric Products, Inc.*

The method of making a selenium rectifier which comprises plating a metal with nickel, hydrogen-firing the nickel coating, coating the nickel with selenium, coating the selenium with cadmium, and baking the resultant unit at about 210°C.

Addition Agent for Nickel Baths

U. S. Patent 2,524,648. *H. Brown, assignor to The Udylite Corp.*

In a process of electrodepositing nickel, the step which comprises electrolyzing an aqueous acid nickel solution of a material selected from the group consisting of nickel sulphate, nickel chloride, and mixtures thereof, said aqueous solution also having dissolved therein a minor proportion of at least .05 gram per liter of a soluble aliphatic sulpho-monocarboxylic acid ester of a water-soluble aliphatic polyhydric alcohol the hydrogen of at least one hydroxy group of which is replaced by an alkyl radical containing from 8 to 18 carbon atoms, the sulpho-monocarboxylic acid radical containing from 2 to 6 carbon atoms inclusive.

Bright Nickel Plating

U. S. Patent 2,524,010. *A. H. Du Rose, and P. W. Moy, assignors to The Harshaw Chemical Co.*

A process of producing bright deposits of nickel comprising electrolyzing an aqueous, acid solution of a nickel electrolyte of the class consisting of nickel sulfate and mixtures of nickel sulfate with nickel chloride, such solution also containing an effective amount of each of two cooperating addition agents, one of such addition agents being ethylene cyanohydrin and being maintained in said solution in concentration from 0.1 to 1.0 gm. per liter and the other of such addition agents being benzene monosulfonic acid and being maintained in said solution in concentration from 0.2 to 10 gm. per liter.

Alkanesulfonate Copper Plating Bath

U. S. Patent 2,525,943. *W. A. Proell, assignor to Standard Oil Co.*

A copper electroplating bath comprising an aqueous solution of a copper alkanesulfonate having between 1 and 5 carbon atoms, inclusive, in the alkyl group, said solution containing at least about 100 grams of dissolved copper per liter and at least about 5, but not more than 25 grams of uncombined alkanesulfonic acid having between 1 and 5 carbon atoms, inclusive, in the alkyl group, per liter.

Periodic Reverse Plating With High Deplate Voltages

U. S. Patent 2,524,912. *G. W. Jernstedt, assignor to Westinghouse Electric Corp.*

In the process of electrodepositing a metal from the group consisting of copper, silver and brass upon a base member from an electrolyte suitable for the electrodeposition of the metal, the steps comprising applying the electrolyte to the base member, passing a unidirectional electrical current at a voltage of not over 10 volts through the base member and the electrolyte to render the base member cathodic for a predetermined period of time of from about 2 to 40 seconds to electrodeposit metal upon the base member, terminating the cathodic current, passing an alternating current through the base member and electrolyte, for a shorter period of time of approximately 0.1 of the period of cathodic current, at least one complete cycle of alternating current being applied to the member in this period, the alternating current having a higher peak voltage than the cathodic voltage, and repeating applying the cathodic current and alternating current cycle until a desired thickness of metal has been electrodeposited on the base member.

Addition Agent for Cadmium Plating

U. S. Patent 2,526,999. *M. B. Diggin and O. Kardos, assignors to Hanson-Van Winkle-Munning Co.*

An alkali-cyanide cadmium plating bath containing in solution as addition agents an oxyheterocyclic compound selected from the group consisting of furfuryl alcohol, tetrahydrofurfuryl alcohol, alkali furyl acrylate, furoin, furyl nitroethylene, and a bath-soluble caustic alkali-furfural resin, in amounts from about 1 to 20 gms./l., and said cyanide cadmium bath also containing in solution 0.025 to 0.2 gm./l. hydroxyethyl cellulose.

Pressure Cooled Polishing Buff

U. S. Patent 2,519,275. *Frank Mollica, Brooklyn, N. Y., assignor to United Buff Products Corp., Passaic, N. J., a corporation of New Jersey.*

A polishing buff having a fabric section consisting of a U-shapped textile strip helically wound upon itself to form an annular body having a plurality of annularly fitted circumferential plies extending outwardly from the bend portion and inner central portion of said annular body, a metal binding ring having malleable prongs interlocked with the plies at the central bend portion of said body, the fabric section having opposing inwardly extending radial folds in said plies contacting each other to form individually enclosed radial air passages, and clamping plates disposed against the sides of the fabric section and provided with means for blowing air into the central area of the fabric section.

Surface Coloring Zinc

U. S. Patent 2,522,474. *G. R. Waitkins and R. S. Shutt, assignors to Battelle Memorial Institute.*

A method of treating a zinc surface which comprises first treating said surface with an alkaline aqueous solution containing a sufficient amount of a dissolved ionizable compound of an element selected from the group consisting of selenium and tellurium to produce an adherent, colored coating on said zinc surface and subsequently treating said coating with a mineral acid solution.

Anode Design

U. S. Patent 2,523,253. *L. N. Smith, assignor to The Harshaw Chemical Co.*

A laminated, soluble, electrodeposition anode, suitable for use in an electroplating bath, comprising a plurality of elongated strips of electrolytic metal sheet, each of a length less than the length of the anode, said strips being arranged in layers with the joints staggered, elongated strips of non-metallic, non-conductive material interposed between and adherent to strips in adjacent layers and mechanically connecting the same together, said non-conductive strips terminating short of each joint and a sheet metal bridge interposed between the metal strips in bridging relation to two strips in the same layer and electrically connecting the same, and metallic supporting means electrically connected to at least one of said strips for supporting the entire anode, said non-conductive strips being inert to and insoluble in said bath.

Continuous Tumbling Mill

U. S. Patent 2,523,258. *N. Ransohoff, assignor to N. Ransohoff, Inc.*

A continuous tumbling mill comprising, an elongated tumbling barrel means for rotatably supporting the barrel upon an inclined axis for gradual advancement of parts through the barrel upon rotation thereof, a motor drive constructed and arranged for rotating the barrel, a conical ramp within the barrel formed at a low point in respect to the incline thereof, said ramp constituting an annular baffle effective to prevent the free escape of parts from the barrel upon rotation thereof, and an ejector element associated with the ramp to convey a predetermined quota of parts up the ramp for ejection from the barrel upon each cycle of rotation of the barrel.

Carbonyl Plating by Immersion

U. S. Patent 2,523,461. *J. T. Young and O. R. Angelillo.*

A coating process comprising: heating an object to a temperature between about 450°F. and 600°F.; dipping the heated object into a solution of a metal carbonyl in a hydrocarbon to deposit a metal coating, the temperature of the carbonyl solution approaching the freezingout point of the carbonyl; removing the object before its surface temperature drops below about 400°F.; reheating the object; re-dipping the object to deposit an additional coating of metal; removing the object as before; and cooling.

Silver Strike Bath

U. S. Patent 2,525,567. *W. M. Tucker and R. L. Flint, assignors to Eastman Kodak Co.*

A silver strike electrolyte, adapted to reduce the efficiency of the silver deposition on a cathode to a range of 20 to 30% consisting, in water solution, of 2 to 3.5 grams of silver per liter, 45 to 50 grams of sodium cyanide per liter, 60 grams sodium carbonate per liter, and 15 to 50 grams of a material selected from the group consisting of an alkali ferrocyanide, an alkali ferricyanide and mixtures thereof.

Addition Agent for Zinc Baths

U. S. Patent 2,524,040. *A. E. Chester, and F. F. Reisinger, assignors to Poor & Co.*

An aqueous cyanide-zinc bath comprising an alkaline cyanide-zinc electroplating bath and the bath soluble chemically combined reaction product of a gelatin with an aldonic acid.

In a process for the electrodeposition of zinc, the step which comprises depositing zinc from an aqueous cyanide-zinc plating bath in the presence of the chemically combined reaction product of a gelatin and an aldonic acid, said reaction product being bath soluble.

Surface Coloring of Cadmium Plating

U. S. Patent 2,524,577. *J. E. Stareck, assignor to United Chromium, Inc.*

A method of forming black surface conversion coatings on cadmium consisting in dipping the cadmium in a water solution consisting essentially of a hexavalent chromium compound of the group consisting of chromic acid, an alkali-metal chromate, and an alkali-metal dichromate, a water soluble acid or salt containing an activating or auxiliary acid radical of the group consisting of sulphate radicals and fluoride radicals, and a water soluble silver compound, the amounts by weight being: Cr^{VI} of the hexavalent chromium compound —15 to 45 g./l., activating acid radical of the compound containing it —40 to 100 g./l., and silver of the silver compound—few tenths of a g./l., and then removing the cadmium from the solution.

Addition Agent for Nickel Baths

U. S. Patent 2,524,619. *H. Brown, assignor to The Udylite Corp.*

In a process of electrodepositing nickel, the step which comprises electrolyzing an aqueous acid nickel solution consisting essentially of a material selected from the group consisting of nickel sulphate, nickel chloride, and mixtures thereof, said aqueous solution also having dissolved therein in a concentration of at least .05 gram per liter a soluble mono-sulphate of a water-soluble aliphatic polyhydric alcohol the hydrogen of at least one hydroxy group of which is replaced by an alkyl radical containing from 8 to 18 carbon atoms, the sulphate group being linked directly to an hydroxy group of the aliphatic polyhydric alcohol.

Zincating Bath for Plating Magnesium Alloys

U. S. Patent 2,526,544. *H. K. De Long, assignor to The Dow Chemical Co.*

In a method of forming an adherent metallic coating upon the surface of an article of magnesium and its alloys, the step which comprises treating the surface of the article with an alkaline aqueous solution having a pH between about 8 and 11 and consisting essentially of water, an alkali metal pyrophosphate, and a water-soluble zinc salt selected from the group consisting of zinc acetate, zinc borate, zinc bromide, zinc chloride, zinc cyanide, zinc fluoride, zinc sulfate, the concentration of the pyrophosphate radical being between 0.6 and 27 grams and that of the zinc being between 0.1 and 4 grams per 100 grams of the solution, whereby a coating of metallic zinc is deposited in situ on the surface of the article.

Recent Developments

New Methods, Materials and Equipment for the Metal Finishing Industries

All-Welded Parts Cleaning Basket

Hoffman Co., Dept. MF, York, Pa.

All-welded construction of spin-dry baskets, in which 8 or more parallel formed steel stays are welded to the top ring as well as to double-reinforced bottom rings, has scored an outstanding record for durability in the hard test of actual production use, it is claimed. Screen material, whether woven wire, expanded metal or perforated metal, is welded at every point of contact with the frame, making the basket one solid unit. The design is adaptable to baskets for most any size parts and is made with special welded reinforcing to take bottom impact or tumbling action.

Bright Finishes for Metals

United Chromium, Inc., Dept. MF, 100 East 42nd St., New York 17, N. Y.

Manufacturers of metal products can still produce durable bright finishes with processes developed by United Chromium, Inc. These finishes do not require use of either copper or nickel.

One finish which is claimed to have been widely adopted is produced with zinc plate, Unichrome Clear Dip, and Unichrome Baking Synthetic B-115. This finish has eye-appeal similar to that of chromium plate; it possesses the well-known protection against rusting of zinc.

To produce this finish, the part is zinc plated to a thickness of .0002″ to .0005″, depending on the application. Then it is treated in Unichrome Clear Dip. This part of the process is flexible, it is claimed, allowing for manual, semi-automatic, or full automatic operation. After the Clear Dipping operation, the parts are dried and given a dip or spray coat of Unichrome Clear Baking Synthetic B-115.

The resulting finish looks very much like chromium. The durability of the finish has been proven in years of use on refrigerator shelves, ice skates, and bicycle parts. At present, the finish is said to be used by manufacturers of automotive, hardware, and electrical appliances.

Another finish receiving consideration is chromium plated directly on the basis metal and the chromium coated with a durable, clear baking synthetic. On steel, this finish is simple to produce. On die castings, however, chromium is deposited as a relatively gray plate which requires buffing to bring up the lustre. Whether plating steel or zinc die-castings, it is advisable to deposit several times the amount of chromium normally used for decorative work. The Unichrome self-regulating high speed chromium plating bath is used among other reasons because of its additional plating speed and also because it is claimed to plate brighter than ordinary chromium solutions on zinc.

Further information on these and other substitute finishes can be obtained by writing to the above address.

Rust-Inhibiting Addition Agent for Water

Haas Miller Corp., Dept. MF, 4th and Bristol Sts., Philadelphia 40, Pa.

A liquid chemical, Immunol, has been developed by the above firm which when added to water, hot or cold, immunizes it against rusting ferrous metals. In addition it is claimed to impart unusual detergent properties and complete "wetting out" action. Immunol solutions are odorless and neutral, contain no soaps or alkalies, are non-inflammable and will not affect the skin, according to this firm.

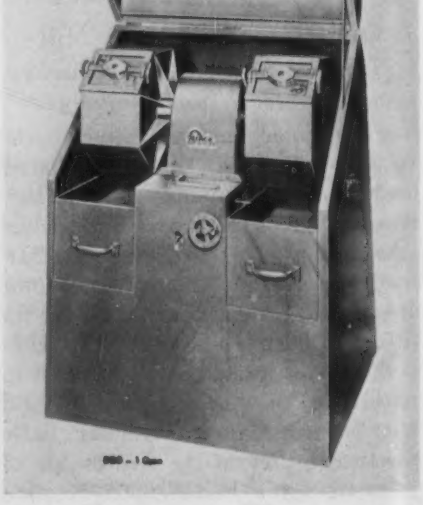
Further information and literature may be obtained by writing.

Small Batch Barrel Finishing Machine

Almco Div., Queen Stove Works, Dept. MF, Albert Lea, Minn.

An outstanding feature of the approved Almco Supersheen Finishing Barrel Model DBO-1 is the removable screening drawers which facilitate separating parts from media, and loading and unloading. Since announced two years ago, this small versatile barrel is claimed to have proven extremely popular with the trade.

It is equipped with variable-speed



drive allowing from 25 to approximately 60 r.p.m. The twin barrels measure 8″ x 16″ and are available with or without ¼″ Neoprene lining. All moving parts are safely enclosed

with the safety hood, and the construction is of heavy welded steel. Model DBO-1 is a complete unit in itself and is recommended for the processing of small lots of parts, the processing of close tolerance work, and for research and development work. Length 26″, width 36″, height 50″. Shipping weight 480 lbs.

Those interested in obtaining full information about this improved barrel as well as the complete line of Almco finishing equipment should make their inquiry to the above address.

Copper Brazing Paste Replaces Copper Plating

The Glidden Co., Dept. MF, Metals Refining Division, Hammond, Ind.

Four important advantages for copper furnace brazing operations are offered by a new type of Cubond, the Glidden Company's copper brazing paste.

The new features include increased savings in manpower, stronger brazed joints, savings in the amount of copper necessary and reduced fluidity of the brazing material.

The paste provides a source of copper that can be applied with more speed and less waste than conventional sources such as rings, foil, slugs and electroplate, it is claimed.

The new Iron-Containing Cubond is available with either a water-thinned or petroleum-thinned base.

Bench Model Wet-Blaster

The Cro-Plate Co., Inc., Dept. MF, 747 Windsor St., Hartford, Conn.

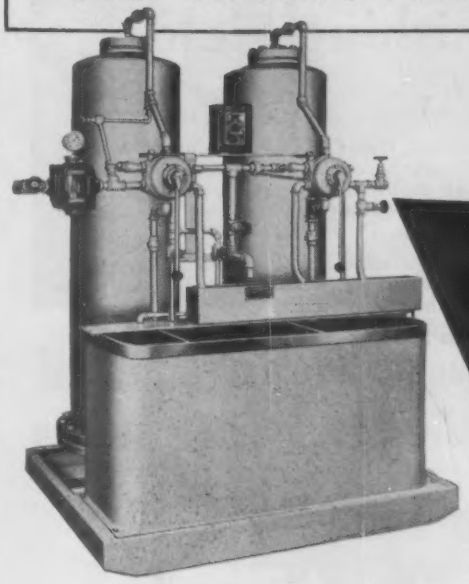
Fast, economical and uniform high luster finishes on all types of metal parts and tools are now possible by the use of a new, low-cost, bench model wet-blaster called the Cro-Hone, Jr., manufactured by the above firm.

Designed to offer a clean base for plating or painting, and to remove completely all foreign and amorphous substance from metal surfaces, the Cro-Hone, Jr. uses a fine abrasive suspended in a water carrier which is forced against the parts by air pressure through a siphon jet gun.

Of full stainless steel construction, the unit has no moving parts or circulating pumps. As a result, maintenance requirements are said to be extremely low. Also, the small, compact construction of the unit, coupled with low abrasive replacement cost suit it to use in tool and die shops, electro-

Eliminate Hot-Rinse Stains Unwanted Precipitates

USE CHEMICALLY PURE WATER



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A Two-Bed INDUSTRIAL Water Demineralizer. Standard two- and four-bed units available with capacities of 200 to 1000 gph. Special units of any capacity engineered to requirements.

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besides the extremely low cost, there is nothing complicated about getting the chemically pure water with Industrial Demineralizers. Raw water is passed through either two or four beds of ion-exchange resins and it comes out free of the dissolved mineral salts. No still, heat, steam, or cooling water is needed—keeping space requirements relatively small.

And it's simple to get the complete facts for your case. Send us a water analysis and let us know how much water you have to treat and the gallons per hour needed. We can then give you the whole demineralizer story including estimated costs, equipment required, performance data, etc. for your requirements.

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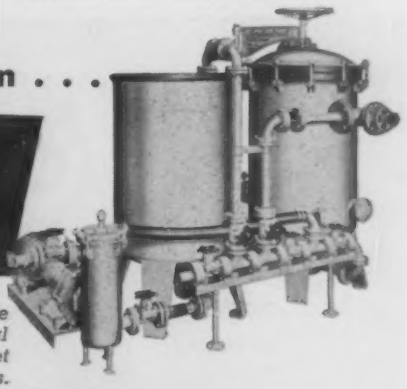

100 to 15,000 gallons per hour. Portable and stationary models. Standard or special filtration systems engineered to meet unusual requirements.

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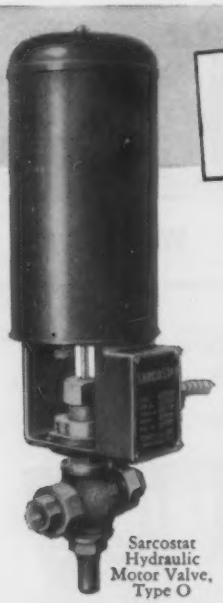


Sarcostat Hydraulic Motor Valve, Type O

Better Valves for the Metal Finishing Field

At last a powerful, electrically operated control valve which does not depend on pilots, gear trains or levers.

The new Sarcostat, type O, is actuated directly by oil pressure on a plunger hermetically sealed in an oil chamber. A 1/100 HP motor drives a small pump to create the thrust. It has a stroke of one inch and will operate valves, single seated to 4", double seated to 8".

Valve bodies are available also in piston or needle types. Actuated by ordinary two-wire thermostats, pressure stats or push button switches.

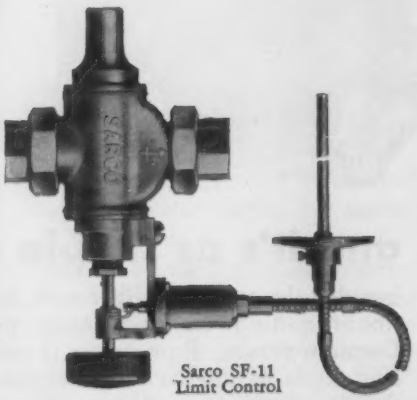
Ask for Bulletin 1082.

Degreaser Safety

Another interesting development is the self-operated Sarco type SF 11 limit control for vapor degreasers.

Should the vapor line rise above the desired level, a liquid-filled thermostat trips shut a valve in the steam or gas supply to the solvent heater. Escape of vapor over the top of the tank is thus prevented. The valve remains shut until manually reset. Available in sizes ½" to 2½", for temperatures to 350°F and pressures to 100 psi.

Full information in Bulletin 651.



Sarco SF-11 Limit Control

700

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In operation, the metal parts to be finished are inserted through the front window door. All openings are fitted with splash-proof guards which allow neat, leakage-free installation. All controls are located within easy reach on the side of the cabinet and the large, clear-view window enables the operator to watch progress of the work. A blower clears away the abrasive splash so that vision is not obscured. The work is held in one hand, the easily manipulated gun in the other.

A removable filter makes cleaning and changing of the unit simple. All that is needed for immediate operation is a ⅜" air connection and a ½" water connection.

Pocket Size, Portable pH Meter

Analytical Measurements, Inc., Dept. MF, 585 Main St., Chatham, N. J.

A revolutionary pocket-size pH meter and companion probe unit permit instant, on-the-spot pH determinations anywhere.

Completely self-contained with batteries, in a bakelite case 3" x 5⅞" x 2½", this instrument is furnished in an ever-ready case with novel plastic tubes of buffer and KCl solutions. Total weight is 3 lbs. Both water-proof and fungus-proof, the ever-ready case comes with a combination hand-and-shoulder strap, allowing the instrument to be slung over the shoulder or hung around the neck, leaving both hands free.

Supports and beakers are completely eliminated by combining the calomel and glass electrodes with the sample holder, in a single polyethylene probe unit. This revolutionary idea of combining the sample holder with the electrodes (Patents Pending) completely protects them and requires a sample volume of only 0.5 ml.

The meter is scaled from 2 to 12 pH for easy reading, and a simple adjustment gives readings from 0 to 14. Accuracy of 0.1 pH is obtainable, it is claimed. Hearing-aid type batteries are said to provide up to 1,300 hours of operation. The electrometer tube, switch and input connector are sealed in a single unit to ensure freedom from high humidity difficulties. The one-knob control and continuous reading features of this instrument simplify operation for untrained personnel. Grounded samples can be directly measured because of no external power connections. The instrument and electrode are completely shielded.

Elimination of "grab samples" and trips to the laboratory by the ever-ready features of this new Pocket pH Meter and Probe Unit, open new fields for "on-the-spot" pH control.

All-Purpose Filter and Pump Unit

Sethco, Dept. MF, 105-107 150th St., Jamaica 4, N. Y.

This firm announces a new filter and pump unit, known as Model HHUE-5, which is designed to handle a wider range of chemicals, including organic solvents, than previous models. It is rated at 50 gallons per hour.

The advantages in filtering with Model HHUE-5 are claimed to be as follows:

1. Resistance to all electroplating and industrial solutions. The combination of the asbestos-impregnated furfuryl alcohol resin filter cylinders and the Hastalloy pump results in a filter pump unit which is claimed to be capable of handling all acids and alkalis and an impressive list of solvents, including the chlorinated aromatic compounds.

2. Higher temperature solutions can be handled. Solutions up to 265°F. (130°C.) can be filtered continuously or intermittently. This permits operation with corrosive chemicals at their

boiling points or even higher, it is claimed.

3. No loss of expensive solution. Filter cylinder holds about 1 pint of solution, all of which is completely recoverable.

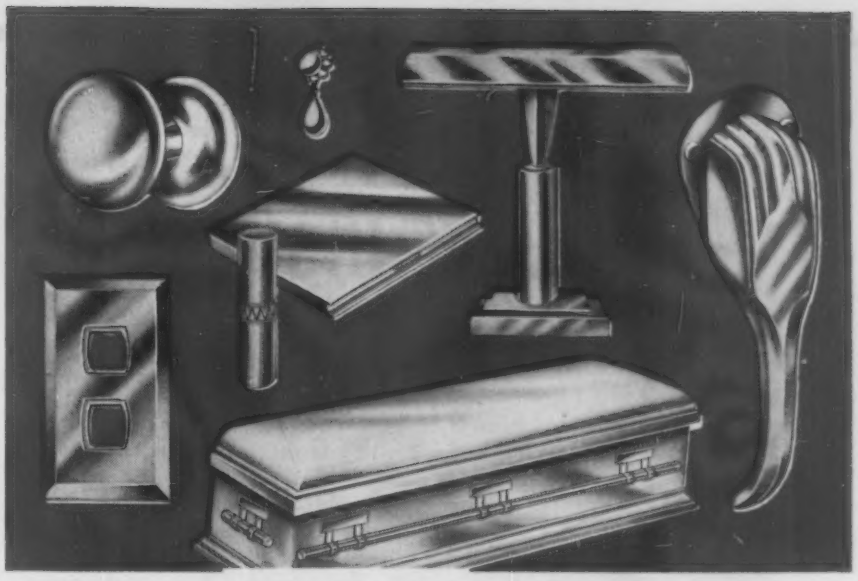
4. Filter tube can be backwashed or washed. Filter element is a specially processed cotton yarn wound around a stainless steel supporting core. Porous stone and porous carbon filter tubes are furnished for concentrated acid and concentrated alkali solutions respectively. Filter tubes may be used over and over again.

5. Crystal clear filtration. Filter tubes will remove even the finest particles, according to the firm.

6. Simple operation. It takes less than 1 minute to get going on any filtration job.

Sethco is also in a position to design special filtering equipment to meet with individual requirements.

For further information, write to the above address.



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Take zinc or steel—apply a coating of one of the new PLATELUSTRE finishes. You wind up with products and parts that look so much like copper, brass and bronze that *the eye can scarcely tell the difference!*

Whether you have been using now unavailable copper and its alloys for *making* products or for *plating* products, you will find these new M & W finishes *equally* effective in keeping your plant running. There are types for air-drying and baking schedules—pick the one that best fits *your* production requirements.

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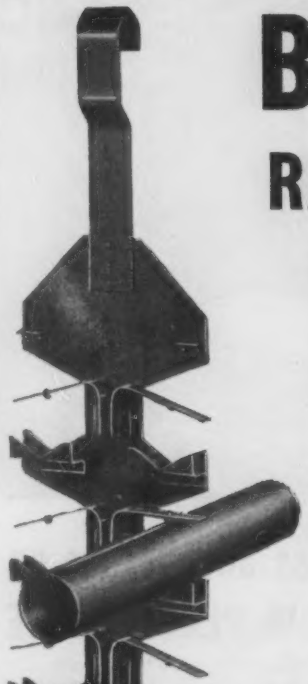
MANUFACTURERS OF INDUSTRIAL FINISHES

New Chromium Anodes

Hanson-Van Winkle-Munning Co., Dept. MF, Matawan, N. J.

A new type of chromium plating anode, called Chrome-Flo, has been developed by the above firm. This anode is especially recommended for the following qualities:

1. Insoluble chromate film formation on anodes is claimed to be markedly decreased with use of special alloy lead Type "S".



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RACK INSULATION
Baking or Air Dry

Paste is unexcelled for use on plating and anodizing racks. No. 1002 forms an extremely tough coating with great chemical and wear resistance. The *one coat Primer* holds the insulation so there is no seepage or carry over from tank to tank. A *single dip* in the Primer and a quick bake; then a dip in the Paste and again a quick bake; and the entire job is done. All in so little time and with so little labor. Racks give months of trouble-free service at a surprising low cost.

Where baking ovens are not available, then AIR DRY insulation is indicated. BUNATOL No. 785 is a solution of the same materials used in the Paste, but dries by evaporation of the solvent. Air Dry can be put on by dipping or with a brush. When enough coats are used, it makes a good tough insulation for racks in all classes of service.

Write for information noting the type of insulation you are interested in. We will gladly give you complete information and samples without any obligation. Address your letter to

Nelson J. Quinn Company
TOLEDO 7, OHIO

2. The open construction shown in the illustration makes higher current densities possible due to better circulation of solution and increased anode surface exposure.

3. Decreased weight of anodes facilitates easier handling.

4. Better covering power, especially on difficult-to-plate parts, due to wider current density range, it is claimed.

5. Open construction permits current to reach both sides of anode thus increasing active area.

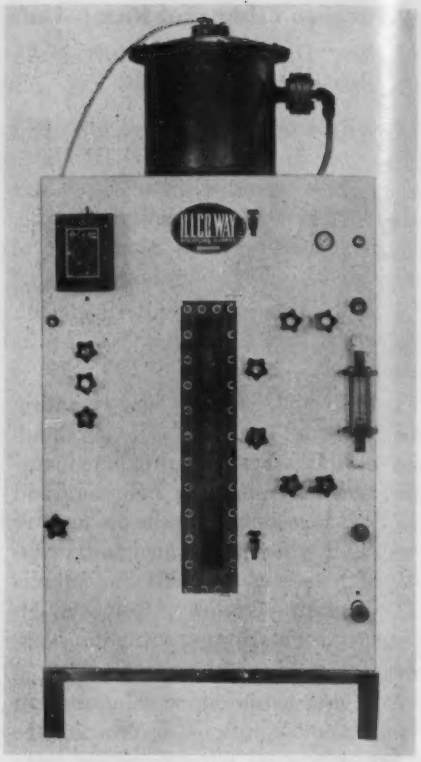
It is best to keep the current turned on at all times when the anodes are in the bath. Anodes should be removed, rinsed and stored in air when tank is idle. If this procedure can be followed anodes will always be ready for use without periodic scrubbing.

Anodes of this new construction can be furnished in 6% Antimony Lead, 7% Tin Lead or any other commonly used alloy.

Water Demineralizing Units

Illinois Water Treatment Co., Dept. MF, 840 Cedar St., Rockford, Ill.

A new method of producing chemically pure water has recently been announced by the above firm. Mixed-Bed de-ionizing equipment, a development of Illco-Way engineering and research departments, will produce a water containing less than 0.1 p.p.m. of dissolved solids and reduce the silica content to less than 0.02 p.p.m. Pictured is a "packaged" Mixed-Bed unit, one of a series available in sizes ranging from 12 to 1,000 gallons per hour. Larger units engineered to meet specific requirements. Complete information contained in 8-page bulletin available from company office in Empire State Bldg., New York City, or main office in Rockford, Illinois.



New Machine Applies Rust Preventative Coating

Cincinnati Cleaning and Finishing Machinery Co., Dept. MF, Schmidt Bldg., Cincinnati 2, O.

A new machine for the application of rust preventative coatings has been announced by the above firm. Especially designed for the application of government specification No. AXS-673 Corrosion Preventative Compound, the machine sprays the compound on parts, then dries the coating before discharging the parts.

The first of these machines has been installed in a mid-west ordinance depot, and is used to rust-proof a wide variety of parts before overseas shipment or extended storage. A wire mesh conveyor belt carries the parts through the following operations at speeds variable from 1½ to 3 feet per minute: loading, oil spray, drain, infra-red drying, cooling and unloading.

Among other features, the manufacturer lists: explosion-proof switches, motors and wiring, spark-proof pumps, supply tank for rust preventative, belt cleaning tank on return leg of conveyor, adjustable infra-red drying lamp bank, automatic CO_2 fire protection.

with automatic fire curtains and spark-proof exhaust fan and duct system.

The machine's overall dimensions are: 46′ long, 8′ wide and 5′-6″ high. The conveyor belt is 33″ from floor level and will accommodate parts up to 22″ high and 48″ wide.

Additional details may be obtained from the manufacturer's engineering department.

Pumice for Finishing Operations

William R. Rogers, Inc., Dept. MF, 70-80 Park St., Beverly, Mass.

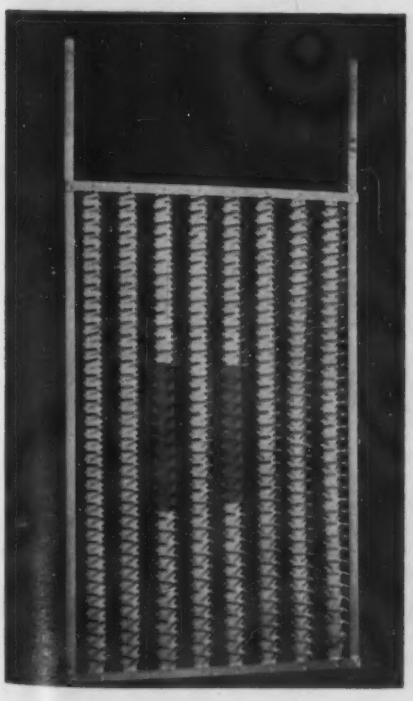
This firm announces that they are now able to supply pumice for metal finishing operations in all grades, including a superior quality domestic pumice especially suited to the plating industry. They also import pumice from Italy. Their line of pumice products includes Oregon King Lump Pumice, all grades of powdered pumice, shoe pegs for barrel polishing, and felt.

They will also maintain a warehouse in the Chicago area, at *4000 Packers Ave.*, to better serve the mid-west plating industry. *Mr. John J. Soukup* will be in charge of the Chicago branch.

Racks for Anodizing Aluminum

All-Brite Chemical Co., Dept. MF, Main St., Oakville, Conn.

This firm has developed a line of special anodizing racks that are claimed to overcome many of the difficulties of home-made racks. The racking members are made of one-piece stamped aluminum that require no rivets, wires



or other connections to come loose. Up to 600 small pieces can be accommodated on these racks, it is claimed. Sample racks may be obtained for a nominal charge.

New Chemical-Resistant Coating

The Atlas Mineral Products Co., Dept. MF, Mertztown, Pa.

The above firm announces a new coating, called Alkaloy 550, which is claimed by them to be highly resistant to all alkalies, solvents, salts and most acids. This product is available as a high solids liquid which is converted at the time of use to a jet-black resilient solid. Products of this general type based on furfuryl alcohol have been known since 1940, when Atlas introduced Alkor, an acid- and alkali-resistant cement. However, coatings based on these compositions have been unsatisfactory in many cases due to their brittleness. The inherent flexibility of Alkaloy 550 is the result of many years of intensive research. It is said to have all the advantages of Alkor but in addition has flexibility not previously available.

It is available in small amounts for experimetal purposes and in unlimited quantities with proper priority.

Chromium Plate Direct-on-Steel Protected by Clear Coatings

Maas & Waldstein Co., Dept. MF, 443 Riverside Ave., Newark 4, N. J.

The unavailability of copper and nickel has forced many manufacturers to resort to the procedure of plating

Start Clean... Stay Clean!

Smart sailor! — he won't risk what it cost to clean his "whites." Neither will the smart plater risk the time, labor, and expense of cleaning work for plating by putting the clean metal into a bath of questionable purity.

Start clean . . . *stay* clean! Red Label Darco S-51 adsorbs — takes out — the impurities that cause trouble in plating baths . . . takes them out of the bath before they can be deposited on the freshly cleaned surface of your work.

Red Label Darco helps you save on scarce anode metals . . . helps you do a better job with thinner deposits and reduce rejects.

With clean metal... keep the Bath Clean

Red Label Darco S-51 is especially treated for use in plating — the only carbon that meets the benzol-mercury test! It is especially easy to handle . . . it wets easily to make a slurry. Order Red Label Darco S-51 today. Practically all suppliers carry Darco in stock — don't accept substitutes.

DARCO DEPARTMENT
ATLAS POWDER COMPANY
Darco General Sales Offices
60 East 42nd Street, New York 17, N. Y.

You need not worry about Chlorinated Solvent Scarcities!

A FAST... SIMPLE METHOD

The Magnus Emulso-Dip Method of pre-cleaning is speedy, simple and effective. Work is dipped into (or sprayed with) the Magnusol cleaning solution. This solution is made up of Magnusol concentrate and kerosene or safety solvent. It rapidly wets and penetrates the dirt on the work, loosening it so that it is completely flushed off when the work is rinsed with water or steam. Not only oil and grease, but all solid dirts, including metal particles, are removed. In many cases it is not even necessary to heat the solution or the flushing water.

Use the Magnus Emulso-Dip Method of Precleaning for Better Results!

With the Magnus Emulso-Dip Method, using Magnusol or related emulsifiable solvent soaps, you get just as effective a degreasing job and, in addition, far better removal or solid dirts which resist vapor degreasing treatments. The operation is often faster, and, in all cases, much more economical. No worry about corrosion of equipment, attack on metals of units cleaned, or harmful effects on personnel.

Our laboratory will be glad to run tests on any of your pre-cleaning operations to determine what you can expect of the Magnus Emulso-Dip process. You will be welcome to watch these tests if you find it convenient to visit our plant. If you are in need of immediate service, please phone us at Westfield 2-2500 in Garwood.

Write for Bulletin 30 to get the complete Emulso-Dip story.

MAGNUS CHEMICAL CO., 11 South Ave., Garwood, N. J.
In Canada—Magnus Chemicals, Ltd., Montreal.
Service representatives in principal cities.

Magnus
CLEANERS • EQUIPMENT • METHODS

chromium directly on steel. Without its customary underlying platings of copper and nickel, the chromium requires a protective coating over it to assure durability.

Such protection can be readily obtained through the use of either one of two clear coatings that are claimed to have demonstrated exceptional durability, according to the above manufacturer.

The two coatings are an air-drying finish, known as Dulac Clear Universal Lacquer No. 462, and a baking finish, known as Codur Clear Synthetic Y743.

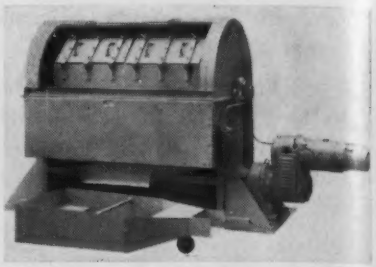
Both these clear coatings withstand salt spray and weatherometer tests for the remarkable period of 800 hours without any evidence of failure, it is claimed.

Enclosed Type, Two-Compartment Deburring Barrel

Belke Manufacturing Co., Dept. MF, 947 N. Cicero Ave., Chicago 47, Ill.

New convenience, efficiency and safety are provided by enclosed deburring barrels announced by the above firm. Turning a hand crank adjusts the enclosed drive to any speed from 10 to 40 r.p.m. Other speeds available.

The aluminum doors are light in weight and easily locked for water tight closure. Wire mesh doors are furnished to be used in place of aluminum doors for draining or rinsing the



work. A steel chute below the barrel guides drainage, media, or work into a tricycle dump pan.

Wheels of the tricycle dump pan are ball bearing equipped. Front of pan has funnel shaped snout for pouring without spilling. Bar across center of pan provides convenient handle for lifting with hoist or by hand. When not in use the dump pan rolls into space provided underneath barrel.

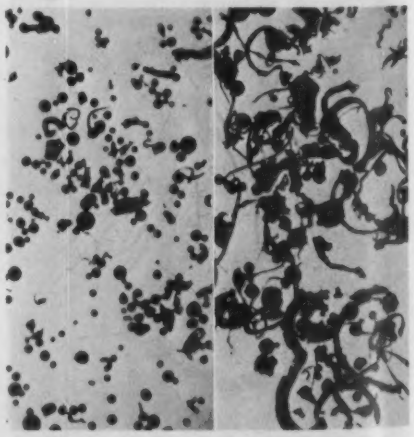
Model illustrated has two compartments lined with hard maple. Each compartment is 22" wide by 29" across the flat surfaces. Can be furnished with 1, 2, 3 or 4 compartments.

Top of the case slides down to form complete enclosure when the barrel is in operation. Magnetic brake and reversing switch are optional features. Descriptive literature on request to the manufacturer.

New Contact Wheel Doubles Belt Life

Carborundum Co., Department MF, Niagara Falls, N. Y.

An entirely new type of contact wheel for abrasive belt polishing on backstand idlers was announced recently by the above firm. The new "61" contact wheel is claimed to permit the operator to get twice as much production from a standard abrasive belt than can be obtained with any contact wheel



Left—Typical particle shape from regular contact wheel grinding. (Right) Shape of particles ground from metal using the new "61" contact wheel.

previously in service with the same belts.

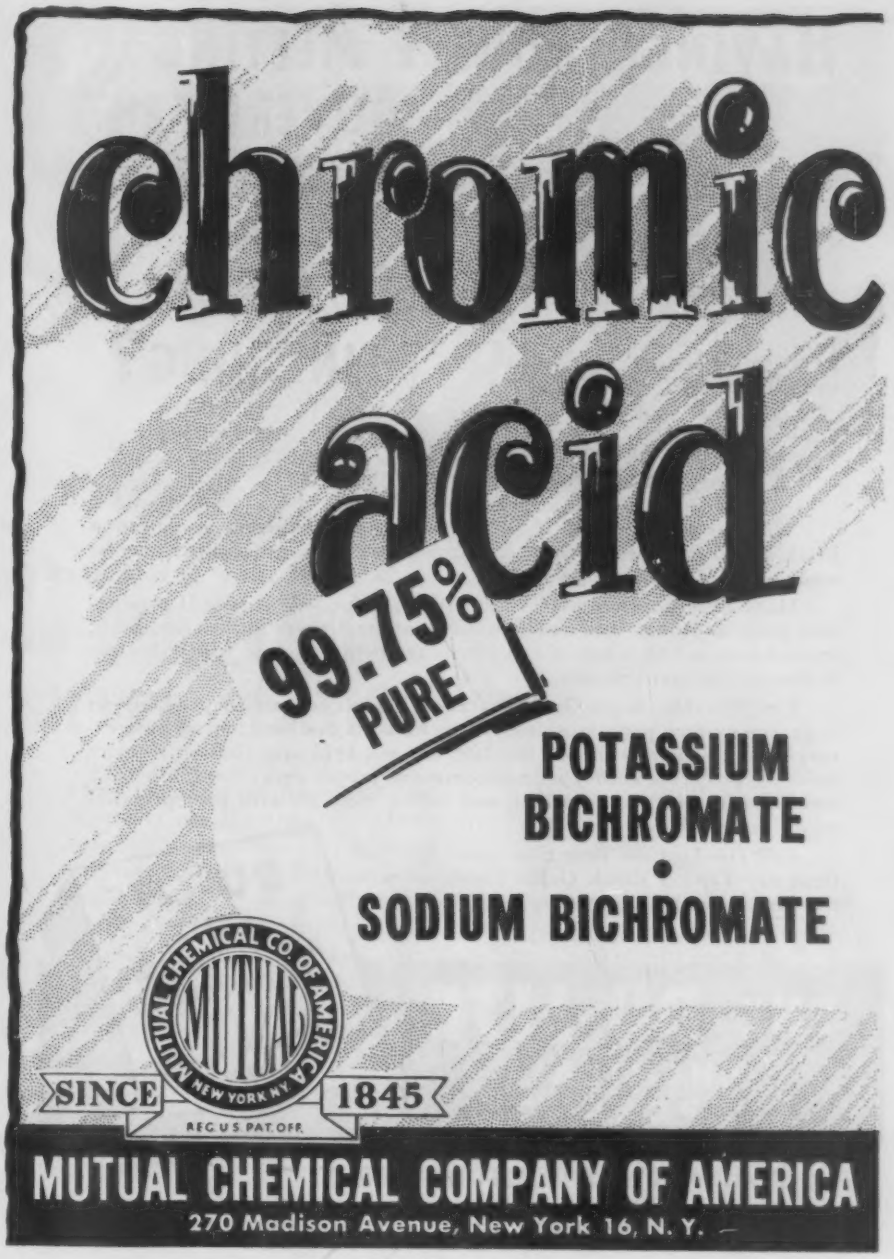
The result of more than three years of development and research by Carborundum engineers, the new "61" wheel is a specially-serrated rubber wheel that causes a controlled breakdown in the bond of the abrasive belt. The result is that glazing, long the enemy of prolonged and productive belt life, is claimed to be reduced to such a great degree that belt life is doubled.

While the idea of a serrated rubber contact wheel is not new, the unique characteristics of the new wheel — the relief angle, wide-spaced lands, narrowness of the lands, which are based largely on the design of milling cutters — are entirely new developments, and are said to be responsible for the increase in belt life and cutting rates. The wheel's rubber surface may be obtained in various rubber hardnesses and in various widths and diameters.

New contact wheel, showing shape of corrugated "teeth."

In the grinding laboratory of Carborundum's Coated Products Division, comparative tests were made on a belt backstand grinder of all known types of rubber contact wheels, using the same belt type. It was found that the new wheel permitted the removal of 2 to 4½ times the total material removed with the use of the other wheels. Similarly, belt life was increased from 2 to 5 times. While initial cutting rates for the first few minutes of operation were as high or higher for belts employed on the other types of available wheels, these fast initial rates dropped off sharply. Belts on the new Carborundum "61" wheel showed a markedly longer, over-all belt life and only a slight reduction in cutting rates.

For the present, these new contact wheels will be marketed through the Carborundum Co. Interested parties, including jobbers, should make any inquiries directly to that firm.



Emulsion Cleaner

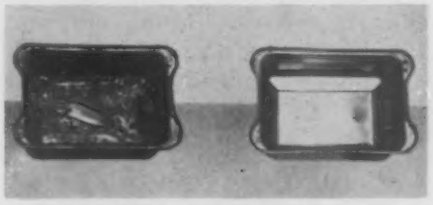
The Magnus Chemical Co., Inc., Dept. MF, Garwood, N. J.

This firm offers their Emulso-Clean process as an efficient method of removing contaminants resulting from metal processing operations. Although not developed merely as a substitute for vapor degreasers, it is being used with complete satisfaction by metal finishers who have experienced difficulty in obtaining trichlorethylene or perchlorethylene, according to this firm.

The Emulso-Clean process is said to be especially effective for removing smut, lithopone, chalk, tripoli, chlorinated and sulphurized oils and other contaminants. It removes these quickly and completely, eliminating the need for hand scrubbing, it is claimed.

The Emulso-Clean process utilizes Magnusol, an emulsion cleaner supplied in concentrated form to be mixed with safety solvent. This neutral, oil and water soluble penetrating agent is non-inflammable at working temperature.

The work to be cleaned is either dipped in a tank of one part Magnusol and eight parts safety solvent, or



Drawn steel box before and after removal of drawing compound by Magnus Emulso-Clean method.

HAVING TROUBLE MEETING GOVERNMENT "SPECS" *for* BLACK FINISHING?

Whether your problem is finding the *right* Government Specification Black Finish for steel parts, or just trouble with the process you may be using — Du-Lite can help you.

Many manufacturers used *Du-Lite finish for World War II production parts finishing. And today millions of steel parts for aircraft, guns, instruments, and all kinds of equipment are being finished with *Du-Lite Black, and for good reason.

The *Du-Lite Black Oxide Process is trouble free and dependable on large, steady-flow parts finishing. Perfect results can be achieved by ordinary workers. Furthermore *Du-Lite has the field organization to meet finishing problems as they arise, recommend proper procedures, supervise installations, train your workers, and follow through with prompt delivery of materials.

Call Du-Lite the next time your specifications say Type 3 Black Oxide Finish, or write for descriptive literature.

THE DU-LITE CHEMICAL CORPORATION

110 RIVER ROAD • MIDDLETOWN • CONN.

"YOU DO IT RIGHT WHEN YOU USE DU-LITE"

sprayed with the mixture for about 30 seconds. It is then removed, allowed to drain and after a rinse with a water spray the metal surface is left physically clean. A final hot water rinse can be used if the work needs to be self-drying.

The Emulso-Clean process is safe to use on all metals and is particularly recommended for steel because it leaves a slight trace of solvent which provides temporary rust protection. It is non-toxic, non-corrosive and non-irritating, according to the firm.

Further information about the Emulso-Clean process can be obtained by writing to the above address.

Substitute for Plating

Strathmore Products, Inc., 1970 W. Fayette St., Syracuse 4, N. Y.

New protective coatings, applied over "Iridite" and similar metalfinishing processes, produce an attractive, durable finish similar to chrome plating, without the use of copper, nickel, chromium etc. These same coatings also greatly add to the life of scant chrome plating now permitted, according to this firm.

There are two types available: Baquik Clear Coating X2534 which is a baking type (range 225°F. for 1 hour to 300°F. for 15 min.) and Metalbond Clear Coating SL-300 which is an air-drying type. Both can be sprayed or dipped. Both are water-white, contain a large percentage of solids, and will not discolor. Both have a high resistance to impact and abrasion and have withstood 200 hours of salt spray with no visible breakdown of the film, it is claimed. This far exceeds the specifications for chromium plating alone.

Portable Oxygen Therapy Unit

Safety Appliances Co., Dept. MF, Braddock, Thomas and Meade St., Pittsburgh 8, Pa.

A portable model of the M-S-A Oxygen Therapy Unit has been introduced by this company. Recommended for oxygen therapy work in industrial and fire fighting emergencies, this portable unit furnishes a flow of oxygen on inhalation, satisfying automatically any breathing demand of the wearer.

Capable of supplying oxygen needs for approximately 90 minutes, this new instrument is mounted on a lightweight metal frame with a clamp and leather handle for ease in handling. The complete unit consists of a half-mask facepiece, pressure regulating assembly, flexible breathing hose and a 40 cubic-foot capacity oxygen cylinder.

According to the manufacturer, the Portable Oxygen Therapy Unit is particularly suited for treatment in cases of cardiac emergencies, gas, smoke and carbon monoxide inhalation. Write for a copy of Bulletin CW-6 describing this new instrument.

Electroplating Iron

Hanson-Van Winkle-Munning Co., Dept. MF, Matawan, N. J.

Considerable interest is being displayed today in the electrodeposition of iron on other materials. The reason for this interest is, of course, increasing scarcity of the other metals under NPA restrictions.

Iron is not difficult to plate, as considerable improvement has been effected in the method of operation. A description of the solutions and methods involved is available from the above firm.

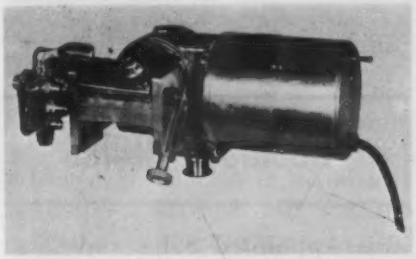
Iron has been definitely recommended for use as a plated coating both on its own merits and as a substitute for

scarce materials. It will be found particularly applicable in the graphic arts and electro-forming fields, acting as a substitute for either copper or nickel. It can also be used in the resizing of worn parts and for coating of conducting and non-conducting materials. Mismachined tools and worn Diesel cylinder liners have been salvaged successfully in this fashion. In electroforming, deposited iron has been used for record stampers, leather embossing dies, radar plumbing, computing cams and printing plates.

The above firm has taken a strong interest in this field and is ready to offer facilities and a staff with unusual direct experience. Installations can be made immediately, since the materials required are not restricted.

Metal Spraying Gun

Metallizing Co. of America, Dept. MF, 3520 W. Carroll Ave., Chicago 24, Ill.



A new metal spraying gun, designed especially for coating shafts, rolls, or machine element parts from a lathe mounting, has just been introduced by the above firm, pioneers of the metal spraying process. Said to be virtually foolproof in performance, this gun boasts a greatly increased spraying speed and can also be used for spraying tanks and structural members. In addition to rebuilding worn parts, it is claimed ideal for spraying corrosion-resistant metal coatings and for reclaiming mis-machined castings and machine parts.

The Mogulectric weighs 20 pounds, thus is designed principally for stationary operation. It is powered with a 1/20 H.P. constant speed induction motor, assuring a uniform wire speed that can be adjusted to the type of metal being sprayed. With it, a spray job can be completed in one-half to two-thirds less time than is possible with any air driven metal spraying unit, it is claimed.

The new gun will spray #15 B. & S. gauge wire up to 3/16" diameter, from the lowest melting point metal to the highest. Speed is rated up to 18 pounds per hour for aluminum and nickel, up to 80 pounds per hour for zinc, according to the firm. Only one adjustment is necessary — that of the variable speed indicator which is regulated according to the metal being sprayed.

Gas requirements are said to be a minimum. For example, when spraying 3/16" stainless steel, the Mogulectric uses 44 cubic feet of acetylene and 68 cubic feet of oxygen per hour. The air used to atomize and carry the metal to the surface being coated is 16 cubic feet per minute at 45 pounds pressure.

Exhaust Fan

International Engineering, Inc., Dept. MF, Dayton, O.

A new product developed by the above firm is an exhaust fan designed specifically for handling sulphuric acid fumes.

The fan is used in chemical plants and steel mill or metal working shops where sulphuric acid is used for processes such as pickling. Constructed of a recently developed material, Carpenter Stainless No. 20, the unit is said to give many times the useful service

When you use SILVER ANODES that bear this mark

you can be sure of PROFITABLE SILVER PLATING

That triangle and 999 "PLUS" FINE mark you find only on Handy & Harman Silver Anodes, means — (1) highest standards in fineness — (2) best physical properties for plating — (3) complete freedom from impurities that cause plating troubles. These qualities mean — smooth-running, trouble-free silver plating production. That's why you can be sure of *profitable* plating when you use Handy & Harman 999 "PLUS" FINE Silver Anodes. TRY them and see the difference.

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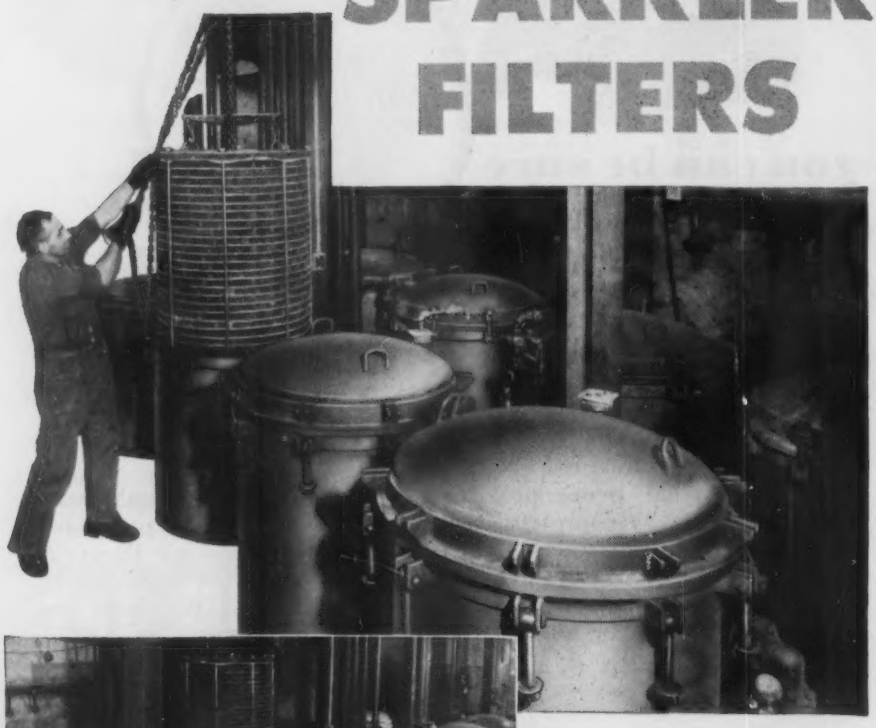
NO SHUT DOWN

To Carbon Treat Solution with SPARKLER FILTERS



A battery of 18 Sparkler Filters in one of the largest bright nickel plating plants in the world.

Carbon treatment without shut down is accomplished by cutting out one or two units in a battery of filters, removing the cartridge assembly of filter plates, and replacing with a new plate cartridge dressed with clean filter paper. The proper amount of carbon is mixed with water in a standby tank and recirculated through the filter thus depositing the carbon on the new plates in a cake of uniform thickness and density. The solution requiring a carbon treatment is then circulated through the carbon beds giving the plating solution the carbon treatment without contaminating the tank or stopping plating operations.

The quick change feature of the plate cartridge in Sparkler filters permits replacing a set of plates in a matter of minutes. Production can be resumed without appreciable interruption.

Sparkler Horizontal Plate Filters give absolutely sharp filtration at all stages of the cycle.

SPARKLER horizontal plate FILTERS

SPARKLER MANUFACTURING CO.
Mundelein, Illinois

life of fans made from other materials. Carpenter No. 20 is capable of withstanding sulphuric acid attack at temperatures up to 176°F.

Protective Hand Creams

The Boyer-Campbell Co., Dept. MF, 6540 St. Antoine St., Detroit 2, Mich.

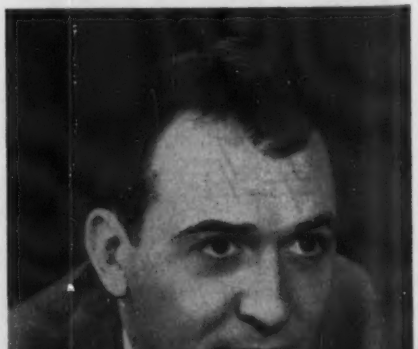
A complete line of barrier creams and liquids for skin protection and cleaning is announced by the Safety Division of the above firm. It consists of six different types of creams and four different liquids to take care of every individual need. The creams come packed in 8 oz., 12 oz., and 16 oz. jars, 12 or 24 jars to a carton and 25 pound pails; the liquids in pints, gallons and 50 gallon drums. In several of the larger automobile plants, they have found that using only two types of "Skin-Cote" gives them almost complete protection and has made dermititis one of their minor hazards, according to the manufacturer. Complete information is available in a sixteen-page catalog.

Business Items

Ellis Appointed Sales and Advertising Manager for Bart-Messing

Raymond G. Ellis has been appointed to coordinate and direct the sales promotion and advertising of four associated companies, *Sel-Rex Precious Metals, Inc.; Bart-Messing Corp.; Bart Laboratories Co., Inc.;* and *Bart Manufacturing Corp.*

As advertising manager of the *Elec-*



Ray G. Ellis

trochemical Society's Journal, Mr. Ellis accumulated a wide knowledge of the electroplating industry and has authored many informative articles on sales stimulation and improved manufacturing procedures.

Vreeland Named Metallurgist of Wagner's Anode Division

J. W. Vreeland

Wagner Brothers, Inc., of Detroit, Mich., has appointed *Jacob W. Vreeland* Chief Metallurgist of the electroplating anode division. Mr. Vreeland has been well-known to the plating industry through his previous association in similar chemical and metallurgical capacities with McGean Chemical Co., The Harshaw Chemical Co., and Hanson-VanWinkle-Munning Co. Wagner Brothers are manufacturers of copper, zinc, tin, cadmium and nickel anodes, electroplating rectifiers and buffing equipment.

Spectranome Plating Co. Moves to New and Larger Quarters

The Spectranome Plating Co., Inc., one of the largest and oldest of New York's job plating firms, announced recently the opening of their new quarters at 330 W. 13th St. and the corner of Gansevoort St., New York City. Much new equipment has been added in order to equip the plant to do all types of metal finishing work in all quantities.

Dr. Wernick, British Plating Expert, to Visit the States

Dr. S. Wernick, one of the leading consultants and experts in the British electroplating field, and Secretary of the *Electrodepositors Technical Society*, will again visit the United States

COMPARE

your present

ALUMINUM FINISHING PROCESS

with these advantages of

IRIDITE® Al-Coat

—see for yourself why more and more finishers of aluminum products are specifying Iridite Al-Coat for any wrought, cast or buffed aluminum part.

1. IN PROCESSING

Faster—Just one simple dip, 10 seconds or only two minutes, depending upon your finishing specifications. No sealing dip, no special drying.

Simpler—Non-electrolytic, no heating or exhaust units, operates at room temperature. No special precleaning baths required.

2. IN APPEARANCE

Clear—Protects metal without changing its original appearance.

Colored—Heavier, iridescent yellow film provides greater protection.

3. IN PERFORMANCE

Corrosion Resistance—Up to 1,000 hours salt spray on wrought stock, 250 hours on castings. Approved under government specifications.

Abrasion Resistance—Will not flake or peel from buffing, bending or scraping.

Paint Base—Blocks underfilm corrosion; grips paint, holds it firmly.

Welding—Finished surface can be spot welded, coating actually aids shielded arc welding.

Conductivity—Offers low surface resistance to electrical current.

4. IN COST

Comparative figures show that Iridite Al-Coat saves as much as 50% over other aluminum finishing processes. *Let us prove this to you.*

Write today for FREE SAMPLES of Iridite Al-Coat. Or, send samples of your product for test processing.

Iridite is approved under government specifications.

ALLIED RESEARCH PRODUCTS
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REPRESENTATIVES IN PRINCIPAL INDUSTRIAL CITIES; West Coast: L. H. BUTCHER COMPANY
Manufacturers of Iridite Finishes
for Corrosion Resistance and Paint Systems for Non-Ferrous Metals; ARP Plating Chemicals

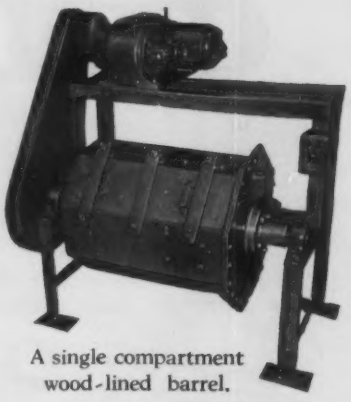
IT'S A FACT...

"There's no single tumbling barrel — or one barrel speed — that will satisfy all types of tumbling requirements."

BUT... there is ONE source of Supply for reliable tumbling barrels and equipment to meet every tumbling need.

HENDERSON BROTHERS offers, from a wide range of tumbling equipment:

- a set speed drive—*for long production runs.*
- a variable speed unit—range 8 to 40 RPM on tilting or horizontal barrels—*for job shop* or *job lot tumbling.*
- horizontal unlined cast barrels or steel tilt-type barrels—*for grinding.*
- wood or rubber-lined horizontal or tilt-type barrels—*for polishing and burnishing.*



A single compartment wood-lined barrel.

Since 1880 Designers and Producers of Tumbling Barrel Equipment.

THE HENDERSON BROS. COMPANY
135 S. LEONARD ST., WATERBURY, CONN.

Dr. S. Wernick

during the month of May. He arrives in New York on the 10th of May, and is anxious to renew acquaintances with his many friends and fellow E.T.S. members in this country. Anyone wishing to contact Dr. Wernick during his visit may write to *Metal Finishing*, and their letters will be forwarded to Dr. Wernick on his arrival.

Pennsalt Forms Industrial Chemicals Department

The Pennsylvania Salt Manufacturing Co. has formed a new sales department, the Industrial Chemicals Dept., combining the former Heavy Chemicals and Special Chemicals Departments, it was announced recently.

The new department will be headed by *Albert H. Clem*, formerly assistant to the vice-president in charge of sales. Previously to that assignment Mr. Clem was a field representative and then assistant sales manager of the former Special Chemicals Department. Mr. Clem will report to R. S. Roeller, Assistant General Sales Manager.

Albert H. Clem

District sales managers appointed for the new department are: Philadelphia, *J. M. Davidson;* Paterson, N. J., *C. M. McCloskey;* Detroit, *Donald Macfarlan;* Pittsburgh, *W. P. Snelsire;* Chicago, *John C. Hampson;* Cincinnati, *Donald W. Graham,* and Appleton, Wis., *C. H. Anderson.*

William J. Hennessy, formerly Special Chemicals district sales manager in Pittsburgh, has been appointed sales supervisor for industrial cleaners for the new department and has been transferred to the Philadelphia office.

At the same time Mr. Drake announced that *George D. Grogan*, formerly district sales manager for heavy chemicals in Chicago, has returned to the Philadelphia office to replace Mr. Clem as assistant to the vice-president in charge of sales.

Edward M. Wilson, formerly district sales manager for heavy chemicals in the Philadelphia office, was also appointed assistant to the vice-president in charge of sales with supervision of all Pennsalt sales to the Federal government.

Higbie Mfg. Co. Appoints New Division Head

Carl M. Higbie, Jr., Vice-President of *Higbie Manufacturing Co.* of Rochester, Mich., announces the appointment of *Richard E. Masters* as General Manager of its *McAleer Manufacturing Div.*

R. E. Masters

Mr. Masters started with McAleer in 1942 and brings to his present position an intimate knowledge of McAleer products. His work has included research, manufacturing and sales engineering and he is now actively promoting the merchandising and sale of McAleer's complete line of polishing and finishing compounds used by the automotive industry and allied industries for metal, paint and plastic polishing and finishing.

Minnesota Mining & Manufacturing Co. Announces Expansion Program

Details of a $6,500,000 plant expansion program were announced by officials of the *Minnesota Mining & Manufacturing Co.* recently.

Most of the projects, located in 10 cities and 8 states, are already under way. Work on the others is due to be in shortly.

R. P. Carlton, 3M president, said the firm is expanding facilities at Atlanta, Ga.; Bristol, Pa.; Buffalo, N. Y.; Cleveland, O.; Lemont, Ill.; Wayne, Mich.; Boston, Mass.; and Hastings, Hutchinson and St. Paul, Minn.

Carlton said the expansion program would provide additional manufacturing and storage facilities for all of 3M's major production divisions.

Michigan Abrasive Plant Razed by Fire

On March 17th a disastrous fire swept the Owosso plant of the *Michigan Abrasive Co.*, causing damage estimated at $2,000,000 and completely gutting the "maker" rooms and the oven room of the coating department. Nearly half the plant was destroyed. The main office containing the firm's records was not touched. The cause of the blaze was not determined.

The firm had been operating the plant in Owosso since 1939, having moved there from Detroit. The firm has other abrasive coating plants in Owosso, as well as one in Rochester, Pa.

It was the second mishap for the firm in the past four months. Its former president, *Mr. James Jackson*, was killed in an automobile accident around Christmas time.

McKenna Elected Vice-President of Hanlon-Gregory Galvanizing Company

William H. McKenna was recently elected Vice-President of Hanlon-Greg-

W. H. McKenna

ONE MAN OPERATION with BLAKESLEE METAL PARTS WASHERS

BLAKESLEE SOLVENT VAPOR DEGREASERS
—economical, efficient—
USE LESS SOLVENT

BLACOSOLV
Stabilized Degreasing Solvent — one price, one solvent *for all metals*

Blakeslee's new washer saves labor, is economical

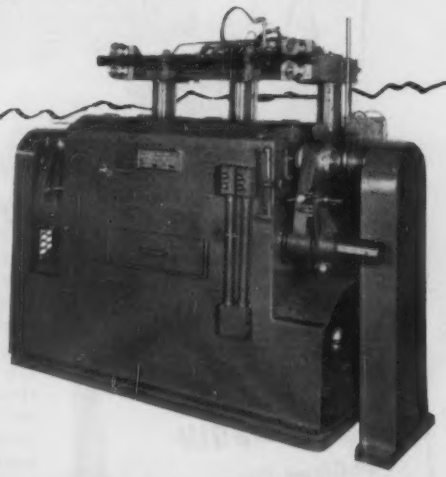
Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

G. S. BLAKESLEE & CO.
1844 S. 52nd Avenue • Chicago 50, Illinois
New York, N. Y. Toronto, Ont.

NEW Central POLISHING AND BUFFING MACHINE

Pays For Itself in 3 Months*

* A small manufacturer of novelties was faced with tremendous polishing costs. Central proved to him that two Model M4 Central Polishing Machines could cut his costs to a minimum and do a better polishing job at the same time. The machines paid for themselves in 3 months and the manufacturer now pockets the savings. If you polish flat or contoured surfaces in any quantity, it will pay you to investigate the possibilities of this machine. It costs nothing to inquire — ask for Bulletin.



Central Model 4 Hydraulic Finishing Machine (18" stroke) is furnished with a contour attachment for polishing many contoured shapes as well as flat surfaces. Machine is well guarded for safe operation by unskilled operators. Model MM 1 (not shown) has a 36" stroke.

Central MACHINE WORKS

INCORPORATED 1918

75 COMMERCIAL STREET, WORCESTER, MASS.

D. M. Ramsey

of the *Exolon Co.*, manufacturers of industrial abrasives, *Mr. Samuel F. Walton*, technical director, and *Mr. Dell M. Ramsey*, works manager of the Tonawanda plant, were elected vice-presidents of the company.

Keystone Carbon Appoints New Sales Manager

The above company announces the appointment of *Mr. Edward J. Crowe* as Sales Manager of the Powder Metal Parts Division. He joined the company in 1948 as an employee in the cost and estimating department. Mr. Crowe is a graduate of the Edinboro State Teachers' College and Pennsylvania State College.

Precious Metal Plating Supply Firm Incorporates

Formation of *Sel-Rex Precious Metals, Inc.*, 229 Main Street, Belleville, N. J., has recently been announced by *Mr. Morris M. Messing*, President of *Bart-Messing Corp.*

With increased laboratory and manufacturing facilities, Sel-Rex Precious Metals, Inc., will provide a wide variety of precious metal salts and solutions of gold, rhodium and silver.

Officers of the Sel-Rex Precious Metals, Inc. are *Mr. M. M. Messing*, President; *Mr. S. G. Bart*, Secretary-Treasurer, and *Mr. E. C. Rinker*, Technical Director.

Cowles Appoints Woleben N. Y. State Representative

People in the metal working industry in New York State are becoming acquainted with *George R. Woleben*, recently appointed Cowles technical man to handle sales and service work

ory Galvanizing Co., Pittsburgh, Pa.

A native of Pittsburgh, Mr. McKenna attended Carnegie Institute of Technology, School of Engineering. He joined Hanlon-Gregory as Purchasing Agent in 1936, and in 1942 was advanced to Assistant to the President, holding that position until his present appointment.

The Company also announces that *A. J. Diebold, Jr.*, Secretary of the firm, has been named to the additional position of Assistant Treasurer. Mr. Diebold has been with the organization since 1941.

Exolon Appoints two New Vice-Presidents

At a recent meeting of the Directors

S. F. Walton

G. R. Woleben

for the Metal Cleaner Department of *Cowles Chemical Co.* in that territory.

Mr. Woleben is well qualified to give valuable assistance to the industrial concerns in the New York State area. He is a graduate of Fredonia State Normal School. During World War II, he served in the United States Army as a Staff Sergeant in charge of maintenance and repair of fire control equipment. Before coming with Cowles, Woleben was employed as a metallurgical microscopist in a supervisory capacity controlling quality of steel in process by Allegheny Ludlum Steel Corp. at its Dunkirk, New York plant.

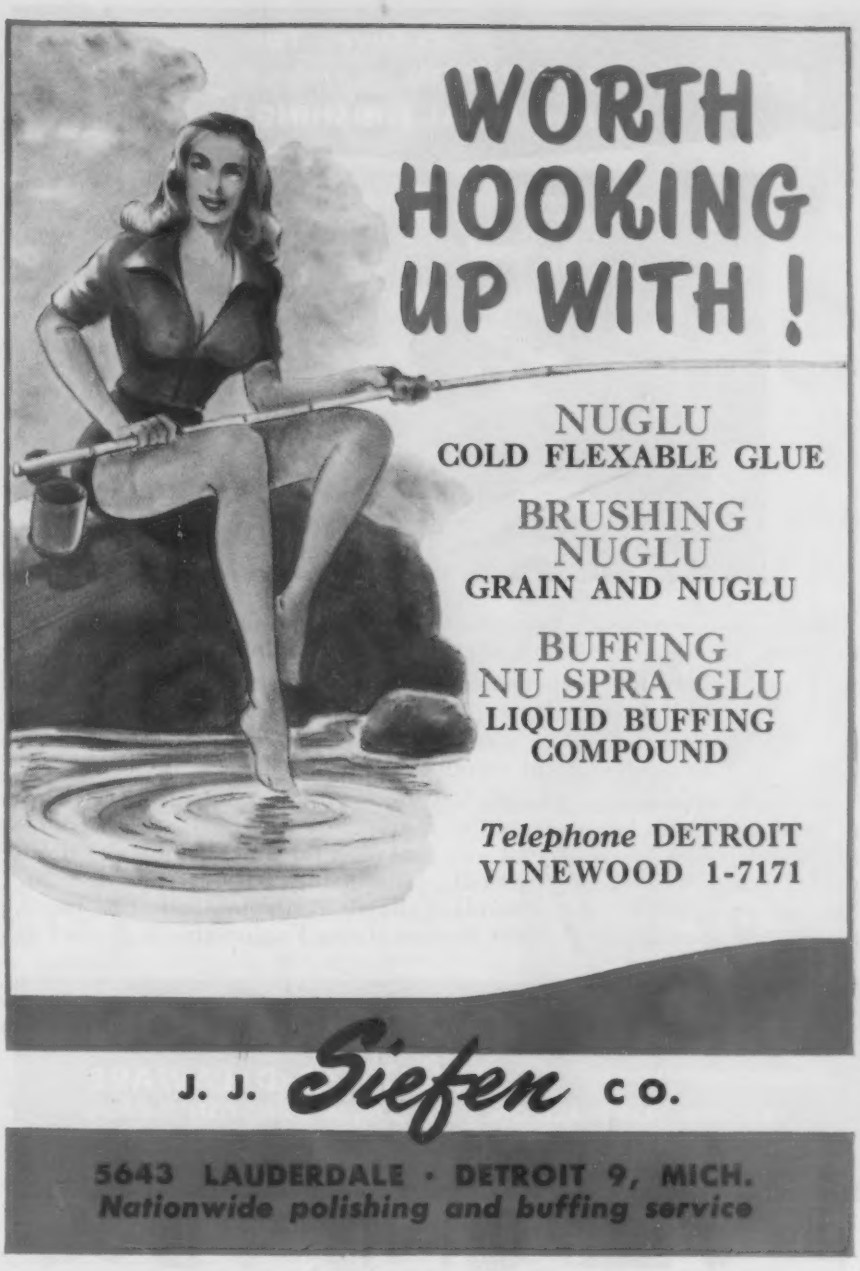
Roy Yasen Joins Special Chemicals Corp.

Mr. Roy Yasen has joined the sales staff of *Special Chemicals Corp. 30 Irving Place*, New York City.

Mr. Yasen was formerly plant superintendent and executive assistant of Atlas Handbag Frame Corp.

Manderscheid Company Adds to Sales Force

The Manderscheid Company, of Chicago, Ill., has announced the addition of *Mr. Harold Manderscheid* to their sales force. Mr. Manderscheid joined the company in 1946 after being released from service with the Air Force. He has been serving in inside capacities with the company until now, and is familiar with all products and their uses. He recently completed a refresher course with various suppliers bringing him up to date on their products and uses. He will confine most of his efforts to the Chicago area, but will be available to back up selling efforts of other staff members in Illinois, Indiana, Michigan and Wisconsin, if the need arises.



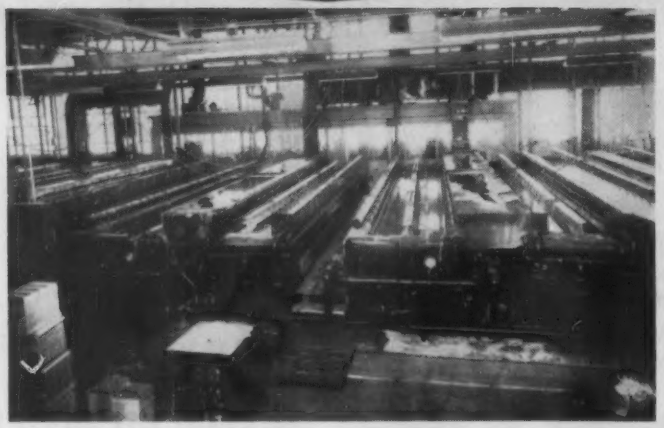
Harold Manderscheid

Univertical Machine Co. Moves to New Larger Quarters

The new building housing the *Univertical Machine Co.*, at 109 W. Pleasant Ave., River Rouge, Detroit 18, Mich., is shown in the accompanying picture. The new building has 7,200 sq. ft. of floor space, has a drive-through arrangement for easy material handling, and includes a kitchen and dining facilities.

The firm specializes in copper products, including copper plating anodes, soldering irons, and copper hammers. It has been manufacturing plating anodes for over 12 years, and its "Bee-

This Program Gives You
PERMANENT PROTECTION *Against Corrosion*
During METAL FINISHING!



To help you *permanently* control corrosion of equipment used for metal finishing, Haveg Corporation offers you this 2-point program:

1. Personal cooperation in the engineering and installation of Haveg tanks and other equipment
2. Complete manufacturing facilities to mold Haveg equipment to fit your individual needs

This means a *permanent* solution to your corrosion problems during metal finishing. That's because molded plastic Haveg is resistant throughout its entire mass to practically all solutions used for finishing metals. Moreover, you have equipment virtually tailor-made for longer service life, improved production. Many standard shapes available—including tanks, piping, fittings, valves, etc. Write for new Haveg Engineering Bulletin F-6.

HAVEG CORPORATION
NEWARK 68, DELAWARE
FACTORY: MARSHALLTON, DEL. · TEL. WILMINGTON 3-8884

CHICAGO 11	CLEVELAND 14	HARTFORD	HOUSTON 6	DETROIT 11	LOS ANGELES 13	SEATTLE 1
1201 Palmolive Bldg.	550 Leader Bldg.	57 Farmington Ave.	4601 Montrose Blvd.	2832 E. Grand Blvd.	601 W. Fifth St.	Vance Bldg.
Delaware 7-6266	Cherry 7297	Hartford 64250	Jackson 2-6065	Madison 1575	Mutual 8955	Eliot 0890

hive" type anode is well known to the plating field. The firm has a direct selling policy, which is said to result in a savings to its customers through the elimination of jobbers. *Mr. Charles Walker* is president and owner of the firm.

Conrad New Manager of Diversey's Southwest Div.

H. B. Conrad, formerly assistant to the manager of *The Diversey Corporation's* Southwestern Div. in Kansas City, has been promoted to manager, it has been announced by *W. E. Noyes*, vice-president in charge of sales.

Conrad brings to his new assignment as manager of the Southwestern Div. a broad background of sales with Diversey. He began in 1942 as a representative in the Farm Quality Control Dept.

H. B. Conrad

Conrad's advancement was rapid, from territory man to senior salesman to district manager in the Southern Div., the position he held a year ago when he became assistant to the manager of the Southwestern Div.

J. W. Stuart Appointed Osborn Eastern Territory Representative

The appointment of *J. W. Stuart* as eastern territory Machine Div. sales representative was announced recently by *The Osborn Manufacturing Co.*

Mr. Stuart has been associated with the foundry industry since 1933. He was formerly foundry manager of the Products Machine and Foundry Company, in Bridgeport, Conn. Prior to that time he was foundry engineer at the Farrel Birmingham Company at Ansonia, Conn.

Mr. Stuart is a graduate engineer

from Tri-State College, Angola, Ind. He resides at 273 Olivia St., Derby, Conn. His territory will consist of all

J. W. Stuart

the New England States with the exception of Maryland, Western New York State and Western Pennsylvania.

Diversey Leases New Plant in Newark

The Diversey Corp., Chicago, which produces and sells chemicals for food plant and industrial cleaning and sanitation, has taken a ten-year lease on a steel frame and brick building formerly occupied by Edgar T. Ward's Son Steel Co., at 400 Frelinghuysen Ave., Newark, N. J.

The new building will provide Diversey's Eastern Div., formerly located in New York City, with a new sales office headquarters and manufacturing facilities of its own for the first time.

Here Diversey products will be produced and warehoused for better service to customers in eastern states. Space in the building also will be provided for laboratory research. *Eric C. Foote, Jr.*, formerly manager of the Diversey plant at Port Credit, Ont., will serve in the same capacity at the Newark plant.

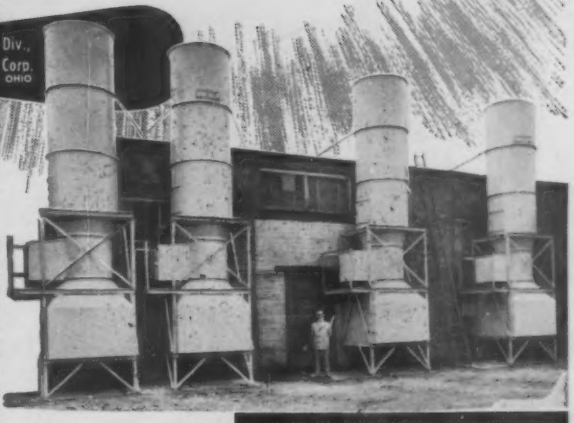
Establishment of manufacturing and warehousing faciliteis in Newark for the Eastern Div. is the latest move in decentralizing production, a trend which has been going on for more than a year, explained Diversey Chairman *H. W. Kochs* in announcing the move.

New Diversey plants began operations in 1950 in South Gate, Cal., for supply of western customers, and in Port Credit, Ont., for supply of customers of The Diversey Corp., (Canada) Ltd., a subsidiary company. Di-

KIRK & BLUM FUME CONTROL SYSTEM

60% More Air Less H.P. Lower Cost

at Estate Heatrola Div., Noma Electric Corp. HAMILTON, OHIO



• Although a conventional duct system would have required as much as 100 H. P., this KIRK & BLUM ductless Fume Removal System uses just 40 H. P. to handle 160,000 cubic feet of air per minute . . . doing an excellent job of fume removal at lower initial cost and lower operating cost.

In this plant of this noted stove manufacturer, a battery of ten 8-foot tanks are ventilated by the fume exhaust system shown. Flexibility of capacity is obtained by operation of one or more fans as production requires. Even when baskets containing the parts are lifted from the tanks, the system easily removes all steam and fumes.

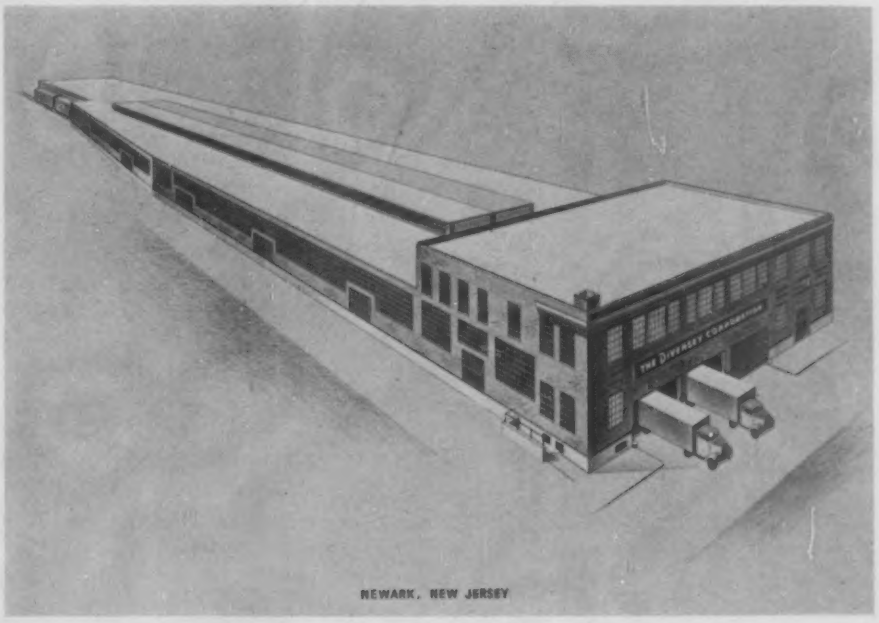
Completely designed, fabricated and installed by KIRK & BLUM, this Fume Control System is another example of engineering skill and experience combined to save money for a long list of America's leading plants. For a comprehensive picture of KIRK & BLUM Fume Control Systems, write today for Booklet, "Dust Collecting Systems for Metal Industries."

FOR CLEAN AIR... THE INVISIBLE TOOL

KIRK AND BLUM

FUME CONTROL SYSTEMS

THE KIRK & BLUM MFG. CO., 3159 Forrer St., Cincinnati 9, Ohio



NEWARK, NEW JERSEY

How to get Finer Finishes at Lower Costs

with GLOBE

Direct Motor Drive

TILTING TUMBLING BARRELS

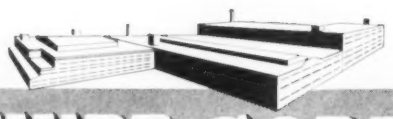
Available in Kiln-Dried Maple or Steel Shells

Process thousands of pieces at one time—faster, better and at lower cost—with Globe Precision Tumbling Barrels, dependable for 47 years. Globe's exclusive six-way work shifting motion cuts tumbling time and increases action. Speeds as low as 30 revolutions per minute assure finer finishes of non-ferrous metal parts. Motor is compactly mounted above the gear segment for space economy.

Free Experimental Service

Hupp's Experimental Engineering Laboratory can show you how to cut finishing costs. Just send samples of the parts to be processed along with a finished part. Write today! There's no charge or obligation.

Hupp Manufactures a Complete Line of Tumbling Barrels and De-Burring Machines.



HUPP CORPORATION

GLOBE STAMPING DIVISION

1250 WEST 76th STREET • CLEVELAND 2, OHIO

SERVING INDUSTRY SINCE 1902

versey also operates two plants in Chicago and one in Macon, Ga., making a total of six, including the new Eastern Div. plant. Eventual plans call for an additional plant to serve customers in the south and southwest.

Location of the Newark plant is convenient to the center of the city's business activity. It stands a block and a half south of the junction of Frelinghuysen Avenue with Highways 22 and 29 into New York City. It is on a Pennsylvania Railroad siding for shipping and receiving carload lots, and has inside truck loading area.

In addition to shipping finished products by rail to distant points, Diversey also will ship by truck to nearby points, a new truck having been provided the Eastern Div. for that purpose.

New York State Industrial Preparedness Survey

In view of the current international situation, the New York State Department of Commerce, with the approval of Governor *Thomas E. Dewey*, is reactivating its inventory of manufacturing facilities as a service to the armed forces and to the industry of New York State.

This program is based on successful experience during World War II. The State's manufacturing resources were converted to war purposes so effectively that they produced a total of 21½ billion dollars worth of war goods from June 1940 to June 1945. Aside from prime contracts, a substantial portion of this total resulted from the countless sub-contracts awarded smaller or less easily converted establishments. Many of these contracts were awarded as a result of the activity of this Department in referring suitable machinery, equipment or facilities to procurement agencies or large prime contractors. To perform this task again, it is essential that current information regarding the production facilities of firms wanting defense work is available.

Forms have been prepared in consultation with experienced production and engineering men. Only information considered essential to the best use of available equipment is being requested. They do not intend to duplicate the work of federal procurement agencies. If you have been notified that your plant has been "allocated" for war production purposes to some branch of the armed services, a statement to that effect will suffice. The prime purpose is to inventory the facilities of, and thereby assist, those firms not already assured of participation in defense production.

Forms may be obtained from the *Department of Commerce, 112 State St., Albany, N. Y.*

MOTOR CITY PLATING NEWS

By EDWARD FINNIE

We've finally seen concrete evidence of the very slowly approaching tremendous volume of defense work as it pertains to platers, that will be produced in the Detroit area. Even this particular installation is 3 or 4 months away, but it is the first big defense order we've run across that is connected with metal finishing.

****

Kaiser-Frazer Corp. is converting a portion of its huge Willow Run plant from automotive to aircraft production. As a vital part of this program, Kaiser-Frazer is installing a very large anodizing, plating, heat treating and painting department.

****

A new addition to the metal finishing

Victor Bowman

firms in the Detroit area is the *Acme Burnishing Co.*, 22212 Dequindre, Detroit. This firm will act as sales agents for Grav-i-Flow Burnishing Equipment in the Detroit area.

Officers of the firm are *Victor Bowman*, owner, *Dennis Jones*, sales engineer, and *Ernie Losey*, sales engineer.

Dennis Jones

Ernie Losey

****

Robert B. Semple, president of *Wyandotte Chemicals Corp.*, announces that manufacturing facilities will be expanded to give an additional 20% production. The company is an important producer of basic chemicals—chlorine, soda ash and caustic soda.

Semple said it was anticipated that chlorine output would be increased by 220 tons a day and soda ash will be increased by 130,000 tons a year.

Overall increases will lift the company's production, at present 1,000,000 tons a year, by 200,000 tons.

****

Metals Plated, Inc., of 21740 Wyoming, Oak Park, Mich. has changed ownership and is now known as *Metals Plated Co.* The concern has been purchased by a syndicate of automotive men and is one of several plants owned by this group throughout the country.

Plans are to greatly expand the facilities of the company in order that higher productivity in the decorative plating field may be accomplished.

Immediate plant personnel now consists of *R. F. Glass*, General Manager; *Paul Sadow*, Plant Manager and *Paul Thompson*, Chemist and Plating Superintendent.

****

Higbie Mfg. Co., Rochester, Mich. has elected *Ralph F. DeBoer* a director of the company. For the past five years, he has been a company vice-president and general manager of its General Crafts Div., producers of formed and finished parts for the automotive, radio and allied industries.

****

Joe Wagner, one of the Wagner Brothers, is sporting a broken right arm. He received this while getting instructions in square dancing. Claims he had no drinks. The golf season is coming up, he ruefully ruminates, and he doesn't play very well with one arm—the left one, at that.

****

Saran Protective Coating Co., 2415 Burdette, Ferndale, Mich., is a new company in the Detroit area. The concern manufactures a line of corrosion-resistant coatings suitable for rack coatings, tanks, duct linings, concrete and process equipment.

Officers of the newly formed company are:

C. J. Weine, President.

Stewart H. Blackmore, Vice-Pres. in charge of sales.

J. W. Reed, Treasurer.

A. C. Troden, Secretary.

J. A. Kloustin, Member Board of Directors.

The company has 17 territorial branch offices in the U. S. and Canada.

****

O. H. Leidy, formerly of Michigan Chrome and Chemical Co., has formed his own company called St. Clair Plating & Chemical Co., 475 Bellevue, Detroit.

"BUCKY" Says....

for best results you can't beat

BUCKINGHAM
POLISHING
AND BUFFING
COMPOSITIONS

- Stainless Steel Composition
- White Finish
- Tripoli
- Chrome Coloring Composition
- Greaseless Composition
- Emery Cake
- Brass Coloring
- Emery Paste
- Burring Compound
- Grease Stick
- Spray Pastes Stainless Steel Tripoli

Representation in Major Cities

Write Dep't A for Samples

The BUCKINGHAM PRODUCTS Co.

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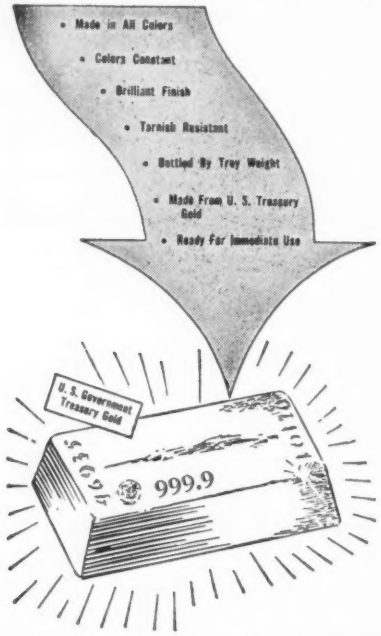
DAVIS-K

GOLD & RHODIUM SOLUTIONS

GOLD and RHODIUM PLATING SOLUTIONS HEADQUARTERS


• Made in All Colors
• Colors Constant
• Brilliant Finish
• Tarnish Resistant
• Bottled By Troy Weight
• Made From U. S. Treasury Gold
• Ready For Immediate Use
U. S. Government Treasury Gold
999.9

DAVIS-K—makers of GOLD PLATING SOLUTIONS—prepared in all colors that produce hard, tarnish-resistant, color constant deposits.

Compounded from U. S. Treasury GOLD and highest (C.P.) chemicals. Sold by troy weight—certified 100% gold content.

Solutions are simple to operate and maintain.

ANTIQUE SOLUTIONS—Deposit gold and antique in one operation—produce uniform finish—simple to operate. Your samples plated at no charge.

We welcome inquiries pertaining to precious metal plating problems. Distributors of Bakers' lustrous RHODIUM SOLUTIONS, that produce a long-lasting white finish.

"Where glittering elegance reflects lasting quality"

DAVIS-K PRODUCTS CO.

54 West 22nd Street | ORegon 5-0094-5 | New York 10, N. Y.

merely his first contacts of the day with plated products. (After dreaming of Esther Williams who would want to shave with a rusty razor anyway?)

Meanwhile his ever-loving spouse, who has probably been having a little dream-affair of her own with the one and only C. G., scurries around a modern kitchen full of time-saving and efficient gadgets — chromed coffee percolators, toasters, grills, refrigerators, to mention just a few — thankful, perhaps unconsciously, for the technical skill of the plater in easing the daily chore of keeping the home attractive, bright and cheerful.

After a hearty and pleasant breakfast to start the day right (non-commuters exclusively), out to the day's work goes Mr. America in his trusty automobile, to which the application and function of plated parts has contributed efficiency and dependability in a thousand ways.

And so it goes — the office machines, machine tools, etc., which he uses through the day, while his wife toils with vacuum cleaners, washing machines, electric irons, kitchen utensils and many others, are literally "shining" examples of the platers' skill and learning. The economical and long-lasting triple-plated silverware on the evening dinner table, the beautiful "Cinderella" of the 20th Century, the family TV set, the final late-hour raid on the sanitary and efficient refrigerator — all these are but further contacts linking Mr. and Mrs. America with the scientific advances prevalent in today's metal finishing industry.

The prime movement in the "advancement o fthe art and science of electroplating" is, of course, the activities of the American Electroplaters' Society. Through its local Branch meetings, and especially through the annual convention when platers from all over the country can meet and discuss their common problems, the A.E.S. is makin ga very significant contribution to the American way of life. However important the past accomplishments in this industry may seem, the future health, comfort and prosperity — yes, even the future existance — of Mr. and Mrs. America and their families will depend, in some measure at least, on the technological progress of the metal finishing industry in the coming years.

The contribution of the metal finishing industry to the production of the weapons necessary to insure our

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Buffalo A.E.S. Convention to Top Previous Meetings

If the early hotel accomodation returns are any indication, the 38th Annual Convention of the *American Electroplaters' Society*, to be held in Buffalo, N. Y. on July 30, 31, August 1, 2, 1951 promises to exceed all previous meeting of the Society in attendance.

This yearly session, always the annual highspot in the life of America's metal finishers, will be further enhanced by having its locale in the hub city of the nation's plating and finishing industry.

Indeed, Buffalo's extremely varied manufacturing operations and plants are representative of all phases of the highly important metal finishing industry, an industry which invades the daily life of the average American in more ways than he is fuly aware of. From the time he arises in the morning and through his entire day until he again retires, Mr. America's health, comfort and convenience are promoted on all sides by the products of the finishing industry. The nickel plated alarm clock that interrupts his dreams of Esther Williams, the gleaming chrome bathroom fixtures, his gold or rhodium plated razor—all these are

American way of life, while not as apparent nor talked about as the other products of the platers' efforts, is especially noteworthy and vital.

This year's 39th annual convention in Buffalo will be another forward step in the united efforts of America's platers to provide their countrymen with the finest possible plated finishes, both decorative and functional.

Social Program

Lest anyone think that these annual A.E.S. conclaves are stuffy, highbrow, and "for men only," we hasten to point out the varied social program planned to keep Mr. Plater and his Mrs. smiling throughout the week. Starting with the *Fellowship Club's* Open House Party on opening night, and continuing through luncheon parties, scenic and sightseeing trips, picnic, ball game, golf tournament, etc., up to the final Annual Banquet, the social whirl will provide a fitting and welcome change from the more serious aspects of the meeting. We've never known any lady who has attended an A.E.S. convention who didn't want to come back again for more. 'Nuff said!

New York Branch to Hear Dr. Wernick, British Plating Specialist

At the May 11 meeting of the New York Branch, the featured speaker will be *Dr. S. Wernick*, well known British metal finishing expert and consultant, and the author of the recent book on "*Bright Plating and Electropolishing*." Dr. Wernick is expected to survey current British electroplating practice and compare it with American procedures, by means of illustrative slides and movies, as well as discussion.

The New York Branch cordially invites anyone interested to attend this meeting, which will be held at the Statler Hotel, New York City, starting at 8 p.m. on Friday, May 11th.

Los Angeles Branch

How the finishing of gray iron soleplate castings used in the manufacture of electric irons is handled in the vast plating shops of the *General Electric Co.*, at Ontario, Calif., was described by *Gilbert Extale*, the firm's chief chemist, at the April 12th meeting of the Los Angeles Branch, American Electroplaters' Society.

As featured speaker of the evening's educational session, Extale took the 85 members and guests on an imaginary tour of the G.E. plant by means of a series of illuminated slides, which enabled the audience to obtain an excellent idea of modern versus early-day plating, polishing and cleaning methods as employed at the General Electric shops. By observing the type of equipment used in the 1920's and 1930's, and noting shop layout and installation methods and type of machines in use, the branch members were able to note the progress that had been made in production line plating at this large plant during the past quarter century.

The business session was presided over by *Richard Wooley*, his last job as presiding officer before he surrendered the gavel to the new president, *Roy Lostutter*.

The following visitors were introduced: *Russell Smith*, Glidden Paint Co.; *Edward Nicodemus*, Hughes Aircraft Co.; *William Crawford*, Kelite Products, Inc.; *Harry Jennings*, Nicholas Plating Co.; *William Fargo*, Smith-Davis Co., *Virgil Sciamanna*, M & M Enamelers; *Herman J. Struckhoff*, Lasalco, Inc., St. Louis, Mo.

William Fargo of the Smith-Davis Co., was initiated into membership.

Jack Bealle, chairman of the Branch's Research Committee, revealed that eight sustaining memberships are now supplied by Los Angeles Branch.

Mr. Herman Struckhoff, of The LaSalco Co., delivered a brief but inspiring appeal for greater branch activity throughout the Society in obtaining more sustaining memberships. He declared that too many branches in the past have been taking "free rides" on the Research Program in that they were content to let other branches sign

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up sustaining members. While congratulating Los Angeles Branch on having eight sustaining memberships, he declared a branch of that size should have from 12 to 15 sustaining memberships. He urged all chairmen of Branch Research Committees to hold monthly meetings of the committee, to make lists of possible sustaining members, to send a different committeeman around every several months to try to "sell" a company if one committeeman fails to make the sale. He declared that the Society has something tangible to sell in offering sustaining memberships in that the effort expended annually on research projects has an estimated value of at least one million dollars.

Walter Behlendorf submitted a report of a special committee which recommended that delegates to the national convention be instructed to vote against the proposal to increase dues to $10.00, on the grounds that times are too precarious to warrant raising membership fees.

A beautiful trophy which was donated as first prize for the waltz contest scheduled as part of the entertainment at the branch's annual dinner ball on April 21 was displayed. *Paul O. Franke*, winner of the 1950 waltz contest, was introduced. Franke urged that the dancing be confined to ". . . . genuine old-fashioned Strauss waltzes, and none of this one-foot hopping around," and expressed himself confident of repeating his victory.

The slate of new officers elected at the March meeting, headed by *Roy Lostutter* as branch president, was installed, with *Earl Coffin* serving as master of ceremonies. Retiring president Wooley was presented with a suitable gift as a token of appreciation by the branch.

Cincinnati Branch

Thirty-six members and guests of the Cincinnati Branch were present at dinner for the March meeting with additional members turning up for the actual meeting which featured a very active business session topped off by the annual election.

The Secretary read a letter from the Chicago Branch on the controversial proposal offered by the Boston Branch that $1.00 of membership fees be allocated to the AES Research Fund if deemed advisable by the AES Executive Committee. After a spirited discussion, the delegates to the Annual Convention in Buffalo were instructed

to vote against the Boston Amendment. No action was taken on the Chicago Branch's suggestion that the $1.00 must be used for research.

President Blount appointed the following Delegates and Alternates to the Annual Convention in Buffalo:

Carl Claybaugh, Chas. T. Nuzum and Charles Wise — Delegates.

C. Walter Parke, E. A. Blount and R. D. Miller—Alternates.

The election of officers for the ensuing year was then held with the following officers being elected:

President — *R. D. Miller.*
Vice-President — *Carl C. Claybaugh.*
Librarian — *Carl Truman.*
Asst. Librarian — *Charles Wise.*
Treasurer — *Chas. T. Nuzum.*
Board of Managers — *Stewart Chipman (R. O. McDuffie & Ferd Bode,* carry-overs from preceding year).

President Miller introduced the speaker, *Mr. R. Vanden Berg,* Manager of the Finishing Section of the Process Development Laboratory, Aluminum Co. of America who opened his talk with a movie entitled, "Dateline Tomorrow." Mr. Vanden Berg then stated that he would recommend an anodic treatment to prevent aluminum alloys from corrosion rather than to electroplate although he said that electroplating was excellent for appearance's sake or to gain surface hardness and to obtain certain functional characteristics. He then discussed various etching solutions using slides to bring home his points.

After the usual question period, the members and guests adjourned for the social hour, which was sponsored by *The Pennsylvania Salt Mfg. Co.*

Boston Branch Annual Education Session and Banquet

On April 7th the Boston Branch held its most successful Educational Session and Banquet at the Statler Hotel. Over 200 members attended the afternoon technical meeting, while the ladies were attending one of the outstanding stage shows as guests of the Branch. In the evening the Statler's huge Main Ballroom was filled with platers, suppliers, their wives and guests who enjoyed an excellent floor show, a mouth-watering dinner of roast beef and trimmings, and dancing. When the formal program concluded at midnight (good old Boston!) the members adjourned to other activities that resulted in many a late breakfast the following day.

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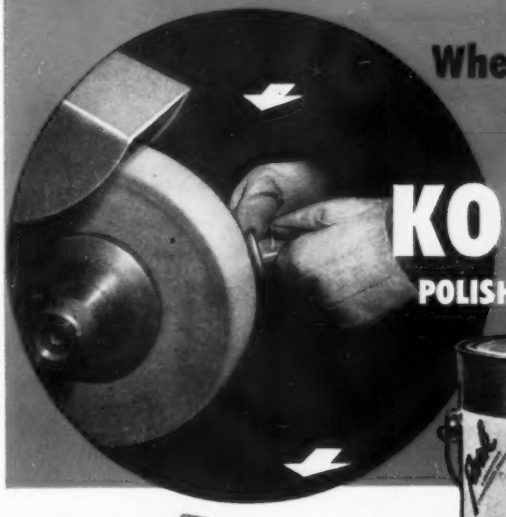

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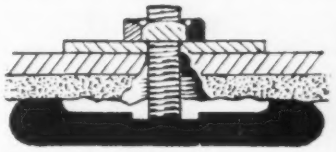

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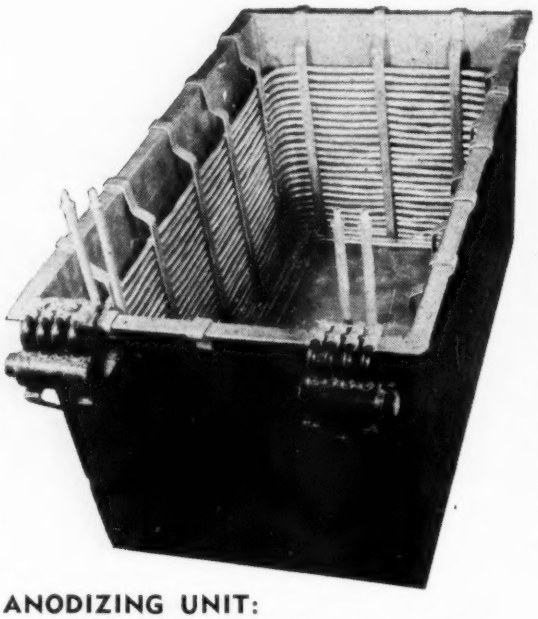

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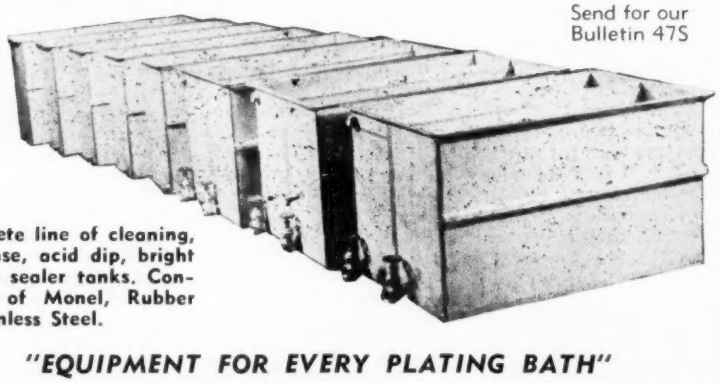

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This Patent Group-List on above subjects presents the main technical claims of 55 U. S. Patents and the complete technical claims of 16 British Patents. Each Patent is dated as to its expiration. Patents date from 1919 through October 1950. Chemists may best evaluate their own research by studying Patents granted to date, and knowing exactly what others are doing. Many processes, methods, formulae and drawings of apparatus shown. Group-List is photo-offset printed on one side of 8½" x 11" sheet. Ask for MF-1 - - - - $5

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This year's technical program was outstanding and right up to the minute. Short resumes of the papers follow.

Plating on Stainless Steel

(By *Herb Head, Briggs Mfg. Co., Detroit.*)

Mr. Head described the successful cycle used at his firm, which does not include any nickel strike, but does utilize an activating dip in a solution of 1% of H_2SO_4 plus 0.1% HCl for about 1 minute. After rinsing and quickly transferring the parts to the chrome bath they are plated directly over the stainless. Power sprays are used at the end of the cycle to eliminate chrome staining. In Brigg's cleaning cycle, very weak alkalies are used at current densities of 5 a.s.f. which prevents etching, attack on the lead auxiliary anodes, and preferential solution of nickel or chrome from the surface of the parts. Quick transfer from cleaning to plating is essential to prevent passivation of the stainless steel surface, according to Mr. Head.

Plating Under Today's Conditions

(By *Myron B. Diggin, Hanson-Van Winkle Munning Co., Matawan, N. J.*)

Mr. Diggin discussed and showed samples of the many alternative finishes being used or considered in the light of today's restrictions and shortages of critical plating materials. Among the substitute finishes shown were chrome direct over bright zinc, bright silver, chrome direct over buffed or bright copper, and many others. He showed corrosion test panels to support his statements that periodic-reverse plated copper gave equivalent corrosion resistance to a similar thickness of nickel. Regular copper plate, he stated, is not as good in this respect.

A new bright silver bath developed by his firm was briefly described and samples of the finish obtained shown. He also mentioned that electrolytic deposition of iron was being utilized in the electroforming industry to save nickel and copper formerly used. Samples of electroformed iron were shown.

Mechanism of Corrosion of Composite Plated Coatings

(By *Jesse Stareck, United Chromium Co., Detroit, Mich.*)

In this lecture Dr. Stareck showed some extremely interesting color slides to illustrate how composite plated coatings may reverse the usual electro-

chemical potentials of the base metal and final coating so that accelerated corrosion, rather than protection, may result. He has found that the best protection is provided when the most noble metal of the two plated metals is applied directly to the base metal. If the least noble of the two is placed in the middle of the "sandwich" accellerated corrosion may result. This can be overcome by providing a final plate which is thicker than some critical thickness, which varies with the metal systems under discussion.

Toronto Branch Annual Educational Session

The annual educational session and banquet of the Toronto Branch of the A.E.S. will be held on Saturday, May 12, at the General Brock Hotel, Niagara Falls, Canada. The usual afternoon technical session will be followed in the evening by a banquet, entertainment, and dancing.

Speakers for the afternoon meeting are:

Mr. G. Lux, Oakite Products, Inc.
Dr. H. L. Kellner, Lea Mfg. Co.
A. Benning, Harshaw Chemical Co.

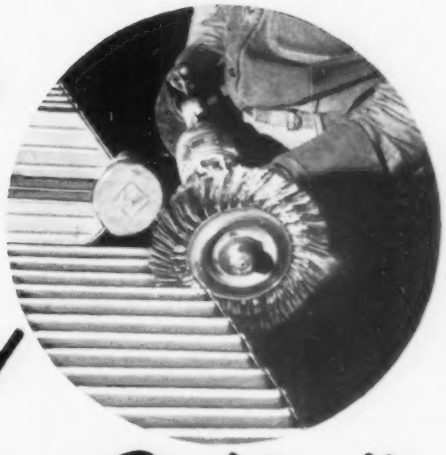
Baltimore-Washington Branch

On March 20 the branch was treated to a very interesting talk by *Mr. R. W. Cook*, of Brush Development Co., who described and demonstrated the technique of using "Faxfilm" for making plastic replicas of metal and other surfaces. Its simplicity and complete reproduction of surface details were most impressive. Specimens of electropolished stainless steel and copper plate brought by those attending were included in the demonstration.

The first item of the business session was the election of convention delegates. *Dr. Blum*, *Messrs. A. Pierdon* and *F. Ogburn* were chosen, with Messrs. *K. M. Huston*, *T. F. Slattery* and *G. E. Best* as alternates.

Much discussion ensued regarding current moves in the direction of raising the minimum dues and increasing the per capita tax. A definite decision was left pending the receipt of information from the Executive Board establishing the need for increased revenue, and indicating the extent to which the per capita tax should be raised to meet the need. Anticipating an increase within the foreseeable future, however, and recognizing that income to the Branch must be increased to take care of operating expenses, the Branch voted unanimously to increase the dues from

How a Pittsburgh Brush Solved an Oil Pressure Problem*



*An actual case history from the Allis-Chalmers Pittsburgh Works, manufacturers of Transformer Radiators.

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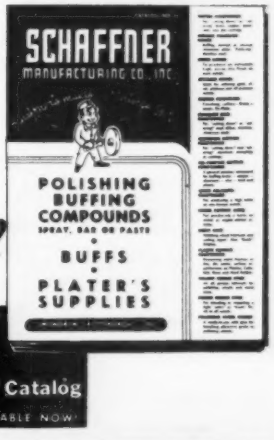

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$9 to $12 effective April 1, 1951, continuing the stipulation that $1 from each member's dues be presented to the Research Fund.

Detroit Branch

The last meeting of the year found the Detroit branch of the American Electroplaters Society with a very well attended meeting at the Statler Hotel on April 6th. Approximately 250 members attended the meeting opened by President *Ed Hahn*, and five more new members were accepted into the world's largest branch.

Webb Knight, of Knight Plating Co., and Research Chairman, gave the annual report concerning the AES Research program.

Following this, a very fine movie, "Fishing in Alaska," was shown.

The results of the election of officers for the coming year were as follows:

President—*Frank Clifton.*
1st Vice-Pres.—*Herb Head.*
2nd Vice-Pres.—*Les Borchert.*
Educational Chairman—*Fred Wagner.*
Secretary-Treasurer—*Joe Gurski.*
Board of Managers—*Frank Watt.*
Delegates—*C. F. Nixon, Herb Head, Walter Pinner.*
Alternate Delegates—*Fred Wagner, Ed Hahn, R. Saltonstall.*

One of the heart-warming features of the election is the election of *Frank Clifton* to the presidency. Through the years he has given much of himself to Detroit Branch activities, and his election bespeaks the general feeling of the branch members for him. This was evidenced last year again when he was presented with a television set.

The principal speaker of the evening was *E. F. Oathout*, assistant manager of the Products Engineering Dept. of the *Behr-Manning Corp.*, Troy, N. Y. His very interesting talk, "Coated Abrasives and the Electroplating Industry," was well received by all present and, at its conclusion, he was subjected to a question and answer period.

ELECTROCHEMICAL SOCIETY

Hunter and Udy to Head Society for 1951

As a result of the annual election, in which the members voted by mail ballot, *Ralph M. Hunter* and *Marvin J. Udy* are the new President and Vice-President, respectively, of *The Electrochemical Society*. The terms of office began Thursday, April 12th, at the Washington Meeting of the Society.

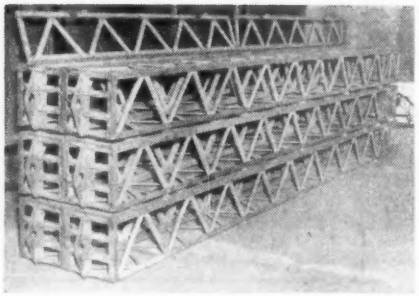
Dr. Hunter, Manager of the Electrochemical Div. of *The Dow Chemical Co.*, Midland, Mich., replaced *Charles L. Faust*, of Battelle Memorial Institute, Columbus, O. Dr. Faust, as Past President, will continue to serve as a member of the Board of Directors.

Other Vice-Presidents, elected during the past two years and who will serve with Mr. Udy, are *J. C. Warner*, President of the Carnegie Institute of Technology, Pittsburgh, and *R. J. McKay* of the International Nickel Co., New York City. *Dr. Henry B. Linford*, of Columbia U., New York City, and *Mr. E. G. Widell*, Radio Corp. of America, Harrison, N. J., will continue as Sec. and Treas., respectively.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS

1952 Conference set for Galveston, Texas

Galveston, Texas will be host to the



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*Patent No. 2,519,275. Other patents pending.

Eighth Annual Conference and Exhibition of the *National Association of Corrosion Engineers* during the week of March 9, 1952, *A. B. Campbell*, executive secretary of the association said. The association, which has members in all parts of the United States and in 20 foreign countries, anticipates registration of over 1,200 at the meeting.

Headquarters of the conference will be the Galvez Hotel, and both technical sessions and the exhibits of corrosion mitigation materials will be on the Galveston Municipal Pier.

1951 Gordon Corrosion Conference

For a number of years the *American Association for the Advancement of Science* has sponsored research conferences on chemical subjects. This year the Conference will be on the topic of Corrosion. Attendance at these conferences is by invitation only, and is usually restricted to about 100 persons. Research workers in the field of corrosion who are interested in attending should make immediate application to *Dr. George W. Parks*, Rhode Island State Univ., Providence, R. I. The Conference meetings will be held during the week of July 23-27 at New London, New Hampshire.

Chairman for the conference will be *Mr. F. W. Fink*, of Battelle Memorial Institute, Columbus, O.; *Mr. John M. Pearson*, of the Sun Oil Co., Newton Square, Pa., is Vice-Chairman. The program for the Conference is as follows:

TOPIC —

"THE EFFECT OF MINOR CONSTITUENTS"

Monday, July 23, A.M.

Introductory Remarks by: (to be announced)
H. A. Robinson*, "Magnesium and Other Light Metals," Dow Chemical Company.

Monday, July 23, P.M.

Milton Stern**, "Aluminum and Alloys in Carbon Tetrachloride," Massachusetts Institute of Technology.
M. L. Holsworth**, "Knife-Line Attack in Stabilized Stainless Steels," Ohio State University.

Tuesday, July 24, A.M.

E. M. Mahla*, "Stainless Steels," E. I. du Pont de Nemours & Co.

Tuesday, July 24, P.M.

F. N. Alquist**, "Minor Constituents in Boiler Water Corrosion," Dow Chemical Company.
A. H. Gropp**, "Polarography in Corrosion," Assistant Professor of Chemistry, University of Florida.

Wednesday, July 25, A.M.

C. P. Larrabee*, "Low-Alloy Steels," U. S. Steel at Vandegrift.

Wednesday, July 25, P.M.

C. L. Bulow*, "Copper and Copper-Base Alloys," Bridgeport Brass Company.

Thursday, July 26, A.M.

Thomas P. May*, "Selected Nonferrous Metals," International Nickel Company.

Thursday, July 26, P.M.

Walter A. Patrick*, "Gases in Metals," Professor of Chemistry, Johns Hopkins University.

Friday, July 27, A.M.

B. W. Dunnington, "A Metallographic Study of Oxidation," Ohio State University.***
R. B. Hoxeng*, "Summary of Discussion on Minor Constituents," U. S. Steel at Pittsburgh.

* *Discussion chairman for this session. Prepared discussion is being solicited from specialists in the field.*

** *A paper of general interest. In a number of cases, the subject matter is closely related to the subject of the conference.*

*** *Present address: E. I. du Pont de Nemours, Wilmington, Delaware.*

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54th Annual Meeting
Atlantic City, N. J.
June 18-22

Seven technical symposiums and many other technical papers on a wide range of subjects in the field of engineering materials are on the program of the 54th Annual Meeting of the *American Society for Testing Materials* at Chalfonte-Haddon Hall, Atlantic City, June 18 to 22, inclusive.

An important feature of the program also will be the Edgar Marburg Lecture to be given by *Frank L. LaQue*, international authority on corrosion, and in charge of the Corrosion Engineering Section, *International Nickel Co.*, who will discuss corrosion testing.

Beginning Sunday, June 17, and extending through Friday, June 22, there will be an estimated 450 meetings of the various ASTM technical committees. Several of these committees have cooperated in developing the technical symposiums featuring the ASTM program.

News from California

By Fred A. Herr

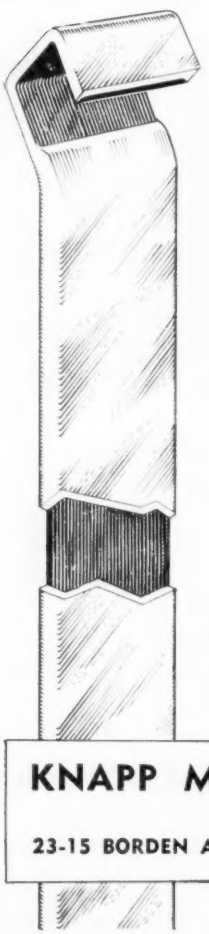
Herman J. Struckhoff, vice-president of *LaSalco, Inc.*, St., Louis, Mo., manufacturers of plating, polishing and burnishing equipment and supplies, was a visitor in California during the 2nd week in April. He conferred in Los Angeles with *Harold A. Shepard* and *George M. Kent*, California distributors of LaSalco products, and also visited San Francisco.

As chairman of the finance sub-committee of A.E.S. Research, Struckhoff addressed the April 11 meeting of Los Angeles A.E.S. Branch with an appeal for accelleration of its program for acquiring sustaining members for the Supreme Society research program.

J. Cranor Richter, executive secretary of the Metal Finishing Association of Southern California, resigned from that post, effective April 1. He now serves as assistant to *E. T. Brown*, president of the Cadmium and Nickel Plating Co. of Los Angeles. Brown is the incumbent president of the association. A committee headed by *Earl Coffin* was active in mid-April in screening the qualifications of various prospects for a successor to Richter in the secretarial post.

Tool & Jig Plating Co. has completed plans for installing some 4,000 amps of additional hard chrome facilities in its shop at 1236 Rio Vista Avenue, Los Angeles. A 600 and 250 gallon solution tank are included among the new equipment. Also being set up is a new baking oven for relieving hydrogen embrittlement and stress relieving on aircraft parts. *Dexter Halldin* and *Ernest Fest* operate the plant.

Progressive Plating Works, 1247 East Hill St., Long Beach, Calif., was featured recently in an article which was one of a series on Greater Long Beach industries published by the daily



Electro-Cupralum Anodes

FOR CHROME PLATING

A NEW AND REVOLUTIONARY DEVELOPMENT

Electro-Cupralum Anodes are manufactured by combining copper and lead through a Homogeneous Extrusion Process whereby the two metals are chemically and inseparably bonded together.

The resultant product consists of a full width *continuous* copper electrode with a Homogeneous lead covering on all sides except the underside of the copper hook.

FEATURES

1. **Ten times the electrical conductivity of any Lead Anode.**
2. **Faster, better plating.**
3. **Even distribution of current through solution.**
4. **Permanently rigid.**
5. **Tenacious, insoluble coatings.**
6. **No build-up of temperature.**
7. **Periodic cleaning unnecessary.**

Electro-Cupralum Anodes are *superior* because they combine the *superior* conductivity of copper with the *superior* protection of lead.

KNAPP MILLS, INCORPORATED

Executive Offices:

23-15 BORDEN AVE. LONG ISLAND CITY, N. Y.

— SAWDUST —

FOR SPOTLESS DRYING OF SMALL PARTS

We manufacture our sawdust from kiln-dried rock maple and it is screened to eliminate all dust. Various mesh sizes are available to meet your requirements for general purpose drying and brightening.

Ground Corn Cobs

An excellent tumbling and drying medium which is highly absorptive and a mild abrasive.

Cube-Cut Wood

Square cut particles containing no dust or fines. Less breakdown, longer life for your drying material.

BY THE CARLOAD OR BAG

BRIDGEPORT SAWDUST and SHAVINGS CO. INC.
22 CROSS STREET
BRIDGEPORT 1, CONN.

Press-Telegram of that city. The article described the founding of the firm in 1945 by two World War II veterans—*Stanley Mashburn* and *Dick Richardson*, and its subsequent growth into one of the largest job plating shops in the city.

According to the newspaper article, the shop obtained its initial impetus when Mashburn and Richardson equipped it with facilities for plating collars and brackets for lighting fixtures. The shop has since expanded from 1875 to 8,000 square feet of floor area, and is now equipped for cutting, trimming, punching and stamping steel, plus facilities for plating, consisting of a dozen plating tanks. A barrel plating line for cadmium and zinc parts is now being installed.

Pacific Abrasive Supply Co. has 26,000 square feet of floor area available for office, warehousing and shipping purposes in its new plant at 2670 Leonis Blvd., Vernon, Calif., a Los Angeles suburb, *Harry M. Bayley, Jr.*, manager, reports.

The firm was established in 1920 by T. W. Bayley, the current president, and the late *H. M. Bayley*. It served originally primarily as a distributor for products of the *Carborundum Co.*, but now also handles a complete line of cutting tools.

The firm of *Shepard & Kent*, distributors of plating supplies and equipment, has moved from 3132 East Washington Blvd., Los Angeles, to larger quarters at 2314 East Eighth Street, same city. *Harold A. Shepard* advised *Metal Finishing* that the new establishment provides 8,300 square feet of floor area for administrative, warehousing and laboratory activities. Inventories formerly housed in four different buildings are now concentrated under one roof.

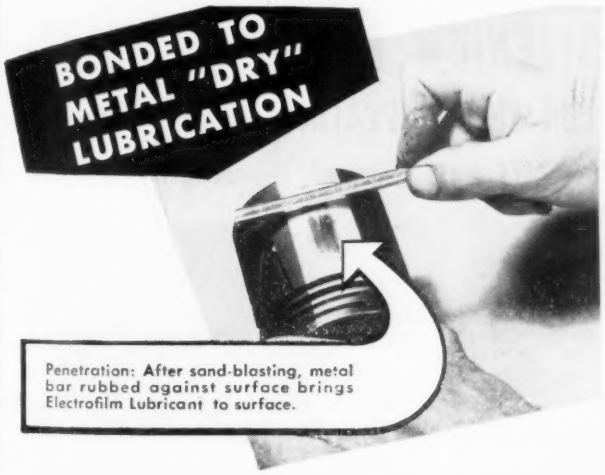
The plating laboratory operated by Shepard & Kent has been re-established with increased facilities, Shepard reported. Physical testing and salt spray testing equipment have been added to the holdover facilities for testing plating solutions. Presiding as laboratory chief technician is *Miss Florence English*. She was formerly affiliated with the Modern Plating Company in Inglewood, Calif., and prior to that connection had been active in the laboratory of McDermid, Inc., Waterbury, Conn.

Manufacturers and distributors of metal finishing equipment and supplies, polishing, burnishing, cleaning and degreasing facilities were numbered heavily among the exhibitors at the *Western Metal Congress* and Exposition held in the Oakland, Calif., auditorium March 19 to 23.

Exhibits by the nation's leading manufacturers and western firms filled the spacious exposition building. The program sessions, including technical papers by many nationally known authorities on metals and techniques for finishing and treating metals, were held in the Oakland Auditorium under the auspices of the American Society for Metals.

Joseph Hart has been appointed manager of metal processing sales for *Turco Products, Inc.*, Los Angeles, and will serve as special sales representative and technical adviser to the metal processing and general manufacturing fields.

A. F. Douglas, who served for about 22 years with the Carborundum Company at Niagara Falls, N. Y., has joined the sales staff of the *R.C.H. Supply*


BONDED TO METAL "DRY" LUBRICATION
Penetration: After sand-blasting, metal bar rubbed against surface brings Electrofilm Lubricant to surface.

SOLUTION TO EXTREME COLD AND HIGH TEMP. LUBRICATION PROBLEMS

Electrofilm built-in lubrication is recommended where oil or grease is not adequate. Solves lubrication headaches for valves, couplings, pumps, gears, hinges, etc. Has excellent oil retention properties for *plus* lubrication in gas engines, electric motors, etc.

• USED BY U. S. Navy, Air Force, Atomic Energy Comm. Aircraft Mfgrs., nationally known industries.

A few territories for custom processing plants and representatives available.

Electrofilm CORP.
7116 LAUREL CANYON BLVD., NORTH HOLLYWOOD, CALIF.

Save Materials!
USE KOCOUR TEST EQUIPMENT
For All Plating Needs!

KOCOUR test sets will help control all plating baths . . . cut plating rejects . . . thus saving scarce materials.

•

Simple to operate . . . no knowledge of chemistry required . . . easy to read . . . no calculations necessary . . . economical to use.

KOCOUR test sets, similar to the above, can be used for controlling plating, cleaning, pickling, and anodizing baths. . . . Special sets can be provided for your requirements.

Write today for complete information — no cost or obligation.

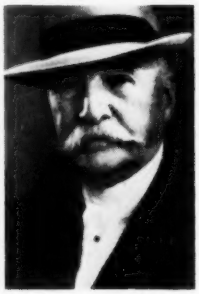
KOCOUR CO.
4802 S. ST. LOUIS AVENUE • CHICAGO 32, ILLINOIS
Specify KOCOUR test sets from your supplier.

Co., Los Angeles, *Russ Hedeen*, president, has disclosed. The firm has taken on west coast distribution for the Behr-Manning line of abrasive belts, including coated abrasive belts and masking tape.

It was less than three years ago that *Louis A.* and *Omer Berard* established the *Berard Spring Mfg. Co.* in South Gate, Calif. Today they have a flourishing plant with the most modern automatic dipping setups in the spring industry. The brothers developed and own the patents on a plastic coating they have named Rubplasco. Production cost problems have been solved by the development by the Berard brothers of a unique automatic conveyor system. This conveyor permits the uncoated springs to be hung by spring clamps onto a continuous conveyor which runs them automatically through the dipping tanks and into the packing and shipping departments. Based on type of coating and length of drying time, the conveyor can handle from 75 to 250 pieces per hour.

Friden Calculating Machine Co., San Leandro, Calif., has an extensive expansion program underway which calls for substantial enlargement of its plating, punch press, automatic screw and plastic departments. Among $82,000 worth of new equipment which is to be installed are a parts washing machine, two tumbling barrels, four abrasive machines, an injection molding unit, and seven new presses and miscellaneous screw production and threading machines. The expansion will add 5,600 square feet of production area.

Obituary



David C. Ball, organizer and chairman of the Board of Directors of *Oakite Products, Inc.*, 22 Thames St., New York, N. Y., died on March 23, 1951, at his home in Lake Placid, New York, at the age of 93.

In 1909 Mr. Ball organized the *Oakley Chemical Co.*, for the manufacture and servicing of industrial cleaning materials to the nation's industries, and later became its president.

In 1926 the name of the company was changed to *Oakite Products, Inc.* and at that time Mr. Ball made effective a plan of "Employee Ownership" under which employees of the company were permitted to purchase a large percentage of the company's stock. His great satisfaction upon the success of this plan caused Mr. Ball to look upon it as one of the crowing efforts of his life work. In 1949 Mr. Ball became Chairman of the Board of Directors of Oakite Products, Inc., which office he held at the time of his death.

Mr. Ball was born in St. Louis Mo., on August 22, 1857. He was educated and resided in that city until 1898 when he moved to New York. While residing in St. Louis, Mr. Ball was long a Director, and for two years President, of the Cotton Exchange. He was also a Director of the Merchants Exchange, an organizer and Director of the Businessmen's League, a life member and for 20 years a Director of the Y.M.C.A., and for several years its Treasurer. He was a member of the Washington University Association,

WILLIAMSVILLE Buffs

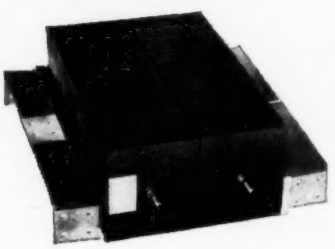
WILLIAMSVILLE BUFF DIVISION EST 1893 A1 ® DANIELSON CONNECTICUT

Cotton Buffs
of Dependable Quality —
Proven by Performance
Over Half a Century

Custom designing to fit all types of buffing requirements

WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company
DANIELSON, CONNECTICUT

SELENIUM RECTIFIER STACKS
FOR ELECTROPLATING POWER SUPPLIES
"Unsurpassed Performance"



3 of these stacks are used in a 10 volt, 5,000 amp. Rectifier Plating Supply Unit.

It pays to specify International Rectifier Corporation Selenium Stacks in your Plating Units. The name "INTERNATIONAL R.C." on the Rectifier Stacks in your Plating Unit is your guarantee of trouble-free, dependable performance.

Now supplying the majority of manufacturers specializing in Electroplating Power Supply Units.

WRITE FOR LATEST TECHNICAL BULLETINS

INTERNATIONAL
RECTIFIER CORPORATION
6809 S. VICTORIA AVE. LOS ANGELES 43

the Academy of Science, the Round Table Club of St. Louis, and the MacDowell Club, and a life member of the Lake Placid Club, the Metropolitan Museum, the Botanical Garden and other organizations. Mr. Ball held the French Legion of Honor, awarded to him by the French government for his help in developing phosphate extraction in Africa in the 1920s.

Surviving are a sister, Mrs. N. Cruikshank; a son, David Spencer Ball of Brookville, N. Y., who is Vice-President of Oakite Products, Inc.: a granddaughter, Mrs. Patricia Ball Reynolds of Boundbrook, N. J.; and two great grandchildren.

NPA RULINGS

(Continued from page 75)

MISCELLANEOUS

Bicycles (except handlebars, sprockets, spokes and hubs).
Electric fans.
Gambling equipment.
Lighters.
Ornamentation on musical instruments.
Pin ball machines.
Slot machines.
Sporting goods.
Tonsorial equipment (except tools).
Vending machines.

LIST B

The folowing items may *not* be nickel plated, except as specially noted after each item, unless the nickel anodes were contained in the plater's inventory as of April 15, 1951.

HARDWARE

Collars and tags for pets.
Bolts, washers and similar fastening devices.

HOUSEHOLD APPLIANCES

(Except parts subject to abrasion or heat and except the strike prior to silver plating or vitreous enameling) including but not limited to:

Cooking stoves and ranges (except door and drawer handles).

Electric housewares including:
- Heating and cooking appliances.
- Motor driven appliances.
- Personal appliances.
- Home and farm freezers.

Laundry equipment including:
- Clothes driers.
- Ironing machines.
- Sewing machines.

Metal furniture and fixtures:
- Commercial furniture.
- Home furniture.

MOTOR VEHICLES

Hubcaps.

MISCELLANEOUS

Bicycle handle bars, sprockets and hubs.
Juke boxes.
Insignia, buttons, buckles, decorations, awards and badges (except military).

Platinum

(NPA M-54)

This new order is the first to restrict the use of platinum for plating. A list of items which *cannot* use platinum or platinum plating follows. If the platinum anodes or salts were in the plater's inventory as of April 1 they can be used up, even on items on the following list. Detailed records of all platinum transactions and use must be kept.

JEWELRY

(Including but not limited to):
Badges.
Bracelets.
Brooches.
Buckles.
Buttons.
Chains.
Combs.
Cuff links.
Earrings.
Hair and head ornaments.
Insignia.
Medallions and other objects of personal adornment.
Pendants.
Rings.

SAVE
CHEMICALS AND HEADACHES
IN YOUR BRIGHT ZINC PLATING WITH

McKeon's
Zinc-Brite
TRADE MARK REG'D.

Reduces frequency of proprietary brightener additions required.

Cuts immersion time and quantity of bright dip chemicals consumed.

INSURES UNINTERRUPTED CONSTANT BRIGHT ZINC PLATING THRU CONSTANT SOLUTION PURIFICATION.

Effectively cleanses your zinc solution of copper, cadmium, lead, tin, mercury, and like contaminations as fast as they get into your electrolyte either from the anodes, work, or external sources.

Prevents harmful accumulation of carbonates.

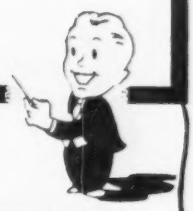
No filtering required. No waiting period. Economical.

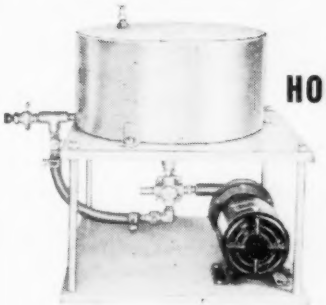
ORDER A 15-GALLON DRUM — $42.75 — ON 30 DAYS' APPROVAL.

Sulphur Products Co. Inc.
Greensburg 7, Pa.

Bright zinc may replace your present nickel-chrome finish.

IS YOUR PROBLEM
PLATING?

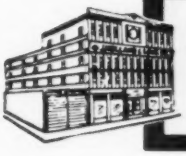




HOLLAND SUGGESTS:

Midget and Junior stainless unit filters. Backwash type.

Contact our technical staff on your metal finishing problems. Write for FREE folder "P" showing our wide selection of metal finishing equipment.



J. HOLLAND & SONS, INC.
MANUFACTURERS • DEALERS
276 SOUTH NINTH ST. • BROOKLYN, N. Y.

Studs.
Watch cases.

MISCELLANEOUS

Bookbinding.
Candlesticks.
Cigarette cases.
Electroplating (except for functional purposes).
Flatware.
Hardware.
Leather goods.
Lettering.
Lighters.
Medals, trophies and objects of art.
Metalized glass and ceramic ware.
Musical instruments.
Optical frames.
Pencils.
Pens (except pen point tips).
Picture frames.
Sign painting.
Tableware.
Toilet sets.
Decorative and ornamental uses, not elsewhere specified.

Aluminum

(NPA M-7)
Amended April 20, 1951

The latest amendment to the original M-7 aluminum order specifiies that use of aluminum products is limited to 50% of the base period average use, effective April 1 to June 30, 1951. It also adds to list A items which may be made of aluminum, subject to the above 50% restriction. This list is given below.

During each of the months of May and June, any person who does not use aluminum for, but who purchases aluminum parts for assembly into items on List A, shall not assemble a total number of units of such item in excess of 50% of the average monthly number of such units which he assembled during the base period.

This order does not apply to persons who use less than 1,000 pounds of aluminum during any consecutive period of twelve months.

Aluminum is permitted in the manufacture of these items, subject to the above limitations.

List A

Airfoil (tubing) for windmills.
Aluminum wool.
Andirons, screens, and fireplace fixtures.
Animal cages.
Animal training equipment.
Animal traps.
Applicators for moistening envelopes.
Arbors and trellises.
Architectural and other building ornamentation.
Ash trays.
Automobile hardware and trim (except functional parts).
Awnings.
Badges.
Balloon molds.
Bar rails, fixtures, and equipment.
Barber chairs.
Batons.
Bathtubs.
Beauty parlor equipment.
Beer equipment: all items.
Bells (except parts where non-magnetic gong material is required for electrically operated signaling devices used as adjuncts to communication systems).
Beverage mixing and serving equipment, such as bottle coolers, cocktail shakers, ice buckets and pails, ice chippers and shavers.
Bicycles and accessories.
Bird and pet cages, houses, aquariums, accessories and equipment.
Blackboard frames and chalk troughs.
Boards: shampoo, tanning.
Book covers.
Book stacks.
*Boxes, including match, cigarette, typewriter ribbon (except instrument cases that require non-magnetic properties).
*Brackets: light, shelf and wall.
*Brooms and brushes (except toothbrushes and industrial).
*Buckles, all types.
Buckets, household.
*Burglar alarms and protective systems (except where essential to the proper servicing or functioning of the parts).
Burial vaults and urns.

BEAM-KNODEL CO.

Metropolitan Distributors

HANSON-VAN WINKLE-MUNNING CO.

Complete Service for Metal Finishing

Products Listed Below Available in New York Stock With Reasonable Exceptions

GENERATORS

Anodes, All Kinds	Tallow	Nickel Salts
Brushes	Rouge	Copper Salts
Buffs	Emery Paste	Cyanide
Chemicals	Cleaners	Tanks, All Kinds
Tripoli Comp.	Emery	Plating Barrels
Acme White Finish	Glue	Polishing Wheels
		Polishing Lathes

195 LAFAYETTE ST., COR. BROOME
Phone CAnal 6-3956-7 NEW YORK 12, N. Y.

FILTERS

MAIZO Drying Materials

LEA Buffing & Polishing PRODUCTS

high speed TIN anodes

M & T's new High Speed Tin Anodes, for use with either sodium stannate or potassium stannate baths, offer several advantages over pure tin anodes.

1. **They can be operated at nearly double the usual current densities without becoming passive.**
2. **They film at little or no excess current density.**
3. **The operating film is darker; more easily recognizable.**

M & T Anodes, both in Pure Tin and of the High Speed type, are available in slab form with cast-in steel hook.

For additional data, write for the bulletin "Alkaline Tin Plating."

METAL & THERMIT CORPORATION
100 EAST 42nd STREET, NEW YORK 17, N. Y.
Specialists in Tin and Tin Chemicals

*Buttons (except for work clothing where necessary to resist corrosion).
*Cabinets: kitchen, medicine.
Calendars, calendar pads and parts.
Cameras: amateur box type still picture, fixed focus (except reflex).
Candle molds.
Canes.
Canopies.
*Cans, including ignition coil and motion picture humidor.
Caps: chimney and vent flue (except for industrial).
Card tables.
Cards, greeting.
Carriages: baby, luggage, strollers, scooters (except functional parts).
Cases:
Cigar.
Film.
Radio, home type.
Soft drink.
Spectacle.
Vanity.
Gaskets, and accessory devices.
Caster cups, wheel casters and glides (except for industrial and materials handling equipment).
Chicken crates.
*Chutes: coal, package, and waste.
Cigarette lighters.
Cleaning accessories, such as carpet sweepers, dust pans and scrubbing sets.
Clothespins.
Coasters.
Combs.
*Containers, foil-lined.
Coops, brooder, chicken, quail, etc.
*Copings.
*Cornices
*Crayon molds.
*Cups.
Curtain, drapery, and carpet hardware.
Cutlery handles.
Cuspidors.
Desk pads.
Dispensers, fixed or portable, for soap, lotion, papers, straws, etc. (except where necessary to resist corrosion for hospital, scientific laboratory, and industrial use).
Dolls.
Door chimes.
*Doors, including, but not limited to:
Coal.
Door frames.
Dumbwaiter.
Incinerator.
Screen.
Storm.
Draperies.
Dresser sets.
Ducts, air conditioning, warm air, ventilating.
Emblems, medals (except religious), crestings and plates.
Fences, wire.
Flag poles, stanchions, and sockets.
Flower boxes, stands, and pot holders.
Forms, concrete vault casting, wax.
Fountains.
Frames:
Electric sign.
Picture.
*Frames, window screen (including top and bottom bars for tension screens).
Frozen fruit sticks.
*Furniture (except medical, dental, and hospital).
*Furniture, hardware (except functional parts).
Games.
Garden tools and equipment.
Garment hooks, brackets, racks, rods, trees, and hangers.
Giftware.
Gutters, leaders and downspouts.
Hair curlers.
Hand-tool handles (except portable electric tools).
Hedge clipping machines.
Highway markers, signals, and signs (except electrically operated traffic control signals).
Holders:
Brush.
Pen.
Soda fountain cup.
*Hollow ware.
Horse shoes.
Ice cream freezers for home use.
Jewelry, all types (except religious goods).
Ladders and step stools (except industrial, fire, and marine).
Laundry accessories, domestic, such as tubs and boilers, washboards, drain boards and tub covers, clothes hampers, ironing boards and tables, garment stretchers and dryers, clothes drying frames, and clothes-line hardware.
Lawn and garden hose accessories, such as sprinklers, nozzles, couplings, clamps, menders, and reels.
Lawn mowers, seeders, rollers, and tampers

TRUE BRITE IS FIRST

TRUE BRITE NICKEL BRIGHTENER was the first nickel brightener definitely designed for barrel plating at higher speeds to match still tank bright nickel and provide for good chromium plating on racks or in barrels.

TRUE BRITE BRASS MAINTENANCE COMPOUND is the first complete brass plating compound designed to take away the headaches of off color deposits. Now available in various ratios for various brass and bronze colors.

TRUE INSULATORS are the first insulators for coils in plating tanks designed especially for the electroplating industry. Available in popular sizes for immediate delivery.

Write for technical bulletins

TRUE BRITE CHEMICAL PRODUCTS CO.

P. O. Box #31 Oakville, Conn.

Practical Products for Practical People

FILTER

Your Solutions 1,000 Times Faster

Throw away your funnels and filter paper.

SETHCO FILTER PUMPS

do the job faster, more efficiently, more economically.

MODEL LSI-10

- Ideal for both continuous and periodic filtration.
- Corrosion proof stainless steel construction.
- No loss of expensive solutions; crystal clear filtration.
- High temp. filter cylinders — transparent lucite or stainless steel.
- Capacity 50-100 gals./hr.; simple operation.

WRITE TODAY FOR DESCRIPTIVE LITERATURE

SETHCO 105-05 150th St., JAMAICA 4, N. Y.

Ledger openers.
Letter openers.
Lightning rods.
Luggage, fittings, trim, and hardware.
Machines: rowing, voting.
Mail boxes.
Maps and globes (world).
Marine construction: pleasure craft and fittings of all kinds, including but not limited to:
- Boats.
- Canoes.
- Rowboats.
- Sailboats.

Markers:
- Grave.
- License plates.
- Price.
- Tee.
- Traffic.
- Tree.

Memorials and tablets.
Mesh bags.
Metal lath, and accessories.
*Metal letters and numbers (except for industrial or public utility control identification).
Mops.
*Mouldings and trim (except functional retaining moundings, shapes, or forms).
Mud scrapers.
Nursing bottles.
Oil cloth, foil-covered.
Ornaments, Christmas tree.
Packaging:
Containers for:
- Bath salts.
- Cosmetics, except collapsible tubes.
- Gifts.
- Powder.
- Shoe polish.
- Tubes, for cigars.

Jars, beauty cream.
Shakers, talcum powder.
Foil for:
- Capsules (except therapeutical).
- Cartons, liquor.
- Florist.
- Household.
- Labels.
- Over wraps (except food).
- Wraps: gift, cosmetic, liquor.
- Wine bottles.

Paper clips.
*Plates: name, scuff, push, kick (except instruction and identification plates on equipment).
Playground equipment.
Pleasure boat fastenings, fittings and hardware.
Portable bleachers.
Roofing, and accessories, residential type (including shingles).
*Rulers (except technical rulers such as slide rules and others used in engineering).
Saddlery, and harness hardware.
*Screening (except insect and that used in technical and scientific equipment).
Shoe heels (except orthopedic).
Shovels, scoops, scrapers and pushers, (except as required for handling food, chemical products and grain in processing and distribution).
Siding and accessories (except industrial).
*Signs, including advertising.
Smokers' accessories.
*Soap dishes and bathroom accessories.
Souvenirs and novelties, advertising specialties.
Spandrels.
Spools such as wire (except magnet), adhesive tape, solder.
Sporting goods, all kinds (except commercial fishery goods, life raft equipment, fishing rod offset handles, and firearms components.
Spray guns (except paint spraying equipment and agricultural sprays).
Spurs, climbing.
Statuary (except religious and artists' originals).
Stencils.
Store fronts, (except glass holding members).
Stove pipe and other flue connections.
*Tent poles, frames, and pegs.
*Thermostatic containers (except shoulders and cups on vacuum bottles of one quart and under size, and special laboratory and hospital equipment).
Toilet seats and covers.
Tokens (except where necessary for electrical operation).
Tombstones.
*Tooth brush and tumbler holders.
*Towel bars.
Toys.
Tricycles and other children's vehicles.
Umbrellas and parasols.
Venetian blinds, fittings, and accessories.
Vending machines (except functional parts).
Waste baskets.
Wheelbarrows (except as required for handling chemicals).

DEPENDABLE SALT SPRAY TESTING EQUIPMENT

Be Sure You Meet Government Specifications

You can test for compliance with critical government plating specifications by using BELKE Salt Spray Equipment. Easy to use — built for long service — economically priced. Tests corrosion resistance of plating, anodizing, galvanizing, paints, synthetic coatings, etc. For information consult a BELKE Service Engineer, or write.

BELKE Salt Spray Bulletin 709 furnished on request.

Belke MANUFACTURING CO.
947 N. Cicero Avenue
Chicago 51, Illinois
EVERYTHING FOR PLATING PLANTS

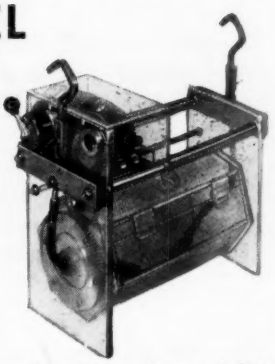
"STUTZ"-The *Original* "Lucite Ribless" PORTABLE PLATING BARREL

The best looking — the best mechanically — The BEST in production! The BEST from any way you look at it. Revolves through the entire plating cycle without transfer of load from one cylinder to another. Maximum solution temperature 185°F. Made in Two Sizes:

6" x 12" $203.50
8" x 18" $302.50

with reversing switch and plug-in cord and with standard perforations of 3/32" or larger.

Small perforations
$8.00 to $28.00 extra



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Windows, storm (except sash slides).
*Windows, residential type.
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FIRST AID STATION

(*Concluded from page 64*)

never have resulted in loss of time if they had received prompt first aid.

It is entirely possible for the smaller establishment to provide adequate first aid if this is strictly limited to simple emergency services. It may be impractical to employ a registered nurse, or even a full-time first-aid attendant, but it should always be possible to select several intelligent employees who can secure the necessary training from the local chapter of the Red Cross, or from a local physician with whom arrangements can be made to guide the work of the first-aid station.

Minimum equipment for furnishing a small first-aid station would include:

An enameled metal dressing table
Several metal or wood stools or chairs
A covered waste pail for used dressings
Several enameled metal basins
A couch covered with a washable material
Several blankets
A pillow
Towels and soap
A deep sink

All of the necessary first-aid materials can be purchased in a General First-Aid Kit, already assembled in moisture and dustproof metal containers that can be affixed to the wall. This kit is for plants with up to 25 employees. The contents include:

Antiseptic
Burn ointment
Aromatic spirits of ammonia
Tourniquet
Absorbent cotton
Sterile gauze pads
Adhesive bandage (ready-to-use dressings with the gauze pad already affixed to the adhesive tape)
Adhesive tape
Roll gauze
Scissors and tweezers
First aid manual

This equipment is adequate for the small station in which the attendant is an employee, since the attendant should not undertake to cleanse or dress serious wounds, set fractured bones, remove imbedded foreign bodies other than near-the-surface splinters, or administer drugs. All serious cases should be referred immediately to the care of a licensed physician.

Larger industrial first-aid kits are available for plants with from 25 to 50 employees and for organizations where employees number 50 and more.

NEW BOOK

Electropolishing and Electrobrightening

Pub. by Patent Publications, Box MF-4094, Washington 15, D. C. 19 pages, 8½ x 11. Price $5.00.

This is a listing of selected patents on the subjects of electropolishing and electrobrightening of metal surfaces. The list includes patents from as far back as 1919, many of which have since expired and are now available for public use without royalty payments or licensing. Most of the electropolishing procedures described are intended to do some particular job, such as pointing, removal of excess solder,

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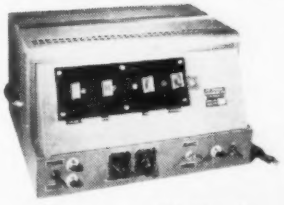
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improving wear resistance, etc., in addition to the usual applications to the production of smooth lustrous surfaces for decorative purposes only. A number of British patents are included along with the American listings.

Manufacturers' Literature

Bench Model Chrome Plating Machine

Ward Leonard Electric Co., Industrial Chrome Div., Dept. MF, 31 South St., Mount Vernon, N. Y.

This firm has just issued a new bulletin describing their small self-contained chrome plating unit for use in tool shops and plating departments in the hard chrome plating of small parts. The equipment utilizes Chromasol solution, a development of this firm which plates chrome on ferrous metals at room temperatures. Plating rate is claimed to be .002" per hour, and the throwing power is said to be sufficient to make auxiliary anodes unnecessary for most parts. The unit has a maximum capacity of 10 square inches of surface at the recommended current density of 2 a.s.f. Complete with built-in power supply and controls.

Alkaline Cleaning of Ferrous Metals

Special Chemicals Dept., Pennsalt Chemicals, Dept. MF, 1000 Widener Building, Philadelphia 7, Pa.

Pennsalt's Special Chemicals Department has just issued a new service bulletin entitled, "Heavy-Duty Alkaline Cleaning of Ferrous Metals."

This illustrated booklet describes in detail approved methods for alkaline soak tank cleaning, alkaline spray cleaning and alkaline electrolytic cleaning and manual (bucket-and-brush) cleaning of walls and floors. Procedures to be followed are fully described, including recommendations for proper cleaners to be used for specialized purposes.

The booklet may be obtained on request by writing.

Plating Rectifiers

Lewis Electrical Mfg. Co., Dept. MF, 1943 Walton Ave., New York 53, N. Y.

This firm has just issued a new catalogue on their line of selenium

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The Real Secret of Better Plating*
Joseph B. Kushner Electroplating School, Dept. MF, Stroudsburg, Pa.
A very interesting bulletin recently published by the above school discusses a very pertinent subject of interest to all plating executives plagued with inefficient production in their plating departments. Copies are available at no charge by writing to the above address.
*REPRINTED FROM METAL FINISHING, JAN. 1951.

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rectifiers for the plating industry. All sizes and models are included for both laboratory and production plating and electrochemical processing. The catalogue also contains wiring diagrams, tables on bus bar carrying capacities, and many other useful tables of data.

Copies of this catalogue may be obtained by writing to the above address.

Corrosion-Resistant Pumps and Heat Exchangers

Nukem Products Corp., Dept. MF, 111-119 Colgate Ave., Buffalo, N. Y.

This firm has just issued a new folder describing their line of cast-resin pumps and Karbate heat exchangers for all types of corrosive service in the handling and heating of chemical solutions. Data on flow rates, pumping pressures, applications, etc. is included. The bulletin also describes their line of floor drains for plating room installations. Copies of the bulletin are available by writing to the above address.

Stop-Off Coatings

Western Coating Co., Dept. MF, 85 W. Union St., Pasadena 1, Cal.

This firm has just issued a 4-page folder describing their line of masking and rack coating materials, as well as the necessary heating pots for melting and holding the materials. Typical jobs accomplished economically and easily with their coating are shown.

Copies of this descriptive bulletin may be obtained by writing to the above address.

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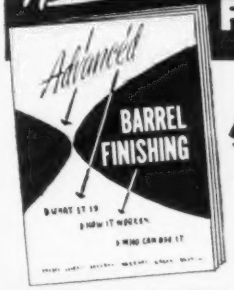

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KHAKI DRAB is an economical, quick, room-temperature dip for work as it comes from zinc plating line. KHAKI DRAB finish will withstand salt spray corrosion tests of 200 hours. This far exceeds Government requirements of 100-hour exposure, so KHAKI DRAB should meet any U. S. Government specifications. KHAKI DRAB is an entirely new type of formulation, differs from any drab finish on the market.

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When finished part is to be painted or enamelled, Luster-on KHAKI DRAB gives under-paint corrosion protection, prevents attack at paint breaks or scratches, guards hidden surfaces. KHAKI DRAB is the ideal adhesive base to bond paint to zinc, grips to all types of organic finishes; resists chipping or marring.

Now Released to General Industry

When first announced the new khaki finish was restricted to Government orders. Now Chemical Corporation officials have given nod to full release to include civilian goods (DO's are given preference). Reason given is that new KHAKI DRAB is economical in use of critical materials. Replacing cadmium and nickel with zinc is first economy. This part is now largely required by NPA orders. Second economy is that KHAKI DRAB uses less ingredients in short supply per square foot of work tested than companion Luster-on Bright Dips, Utility-15 and Utility-25.

Sample Parts Treated Free

Sample parts sent to laboratory will be processed with either Luster-on KHAKI DRAB or Utility Bright Dip and returned without obligation. Technical advice for conversions to Luster-on is available. Address inquiries to The Chemical Corporation, 58 Waltham Avenue, Springfield 9, Mass.

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